

Management Indicator Species Report

Sunny South Insect Treatment Project

American River Ranger District

Tahoe National Forest

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1. Introduction

The purpose of this report is to evaluate and disclose the impacts of the Sunny South Insect Treatment Project on the habitat of the thirteen (13) Management Indicator Species (MIS) identified in the Forest (NF) Land and Resource Management Plan (LRMP) (USDA 1990) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (USDA Forest Service 2007a). This report documents the effects of the proposed action on the habitat of selected project-level MIS.

MIS are animal species identified in the SNF MIS Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Tahoe National Forest (TNF) Forest Plan as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the TNF Forest Plan as amended.

1.a. Direction Regarding the Analysis of Project-Level Effects on MIS Habitat

Project-level effects on MIS habitat are analyzed and disclosed as part of environmental analysis under the National Environmental Policy Act (NEPA). This involves examining the impacts of the proposed project alternatives on MIS habitat by discussing how direct, indirect, and cumulative effects would change the habitat in the analysis area.

These project-level impacts to habitat are then related to broader scale (bioregional) population and/or habitat trends. The appropriate approach for relating project-level impacts to broader scale trends depends on the type of monitoring identified for MIS in the Forest Plan as amended by the SNF MIS Amendment ROD. Hence, where the TNF Forest Plan as amended by the SNF MIS Amendment ROD identifies distribution population monitoring for an MIS, the project-level habitat effects analysis for that MIS is informed by available distribution population monitoring data, which are gathered at the bioregional scale. The bioregional scale monitoring identified in the TNF Forest Plan, as amended, for MIS analyzed for the Sunny South Project is summarized in Section 3 of this report.

Adequately analyzing project effects to MIS generally involves the following steps:

- Identifying which habitat and associated MIS would be either directly or indirectly affected by the project alternatives; these MIS are potentially affected by the project.
- Summarizing the bioregional-level monitoring identified in the Forest Plan, as amended, for this subset of MIS.
- Analyzing project-level effects on MIS habitat for this subset of MIS.
- Discussing bioregional scale habitat and/or population trends for this subset of MIS.
- Relating project-level impacts on MIS habitat to habitat and/or population trends at the bioregional scale for this subset of MIS.

These steps are described in detail in the Pacific Southwest Region's draft document "MIS Analysis and Documentation in Project-Level NEPA, R5 Environmental Coordination" (May 25, 2006) (USDA Forest Service 2006a). This Management Indicator Species (MIS) Report documents application of the above steps to select project-level MIS and analyze project effects on MIS habitat for the Sunny South Project.

1.b. Direction Regarding Monitoring of MIS Population and Habitat Trends at the Bioregional Scale

The bioregional scale monitoring strategy for the TNF's MIS is found in the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD) of 2007 (USDA Forest Service 2007a). Bioregional scale habitat monitoring is identified for all twelve of the terrestrial MIS. In addition, bioregional scale population monitoring, in the form of distribution population monitoring, is identified for all of the terrestrial MIS except for the greater sage-grouse. For aquatic macroinvertebrates, the bioregional scale monitoring identified is Index of Biological Integrity and Habitat. The current bioregional status and trend of populations and/or habitat for each of the MIS is discussed in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a).

- **MIS Habitat Status and Trend**

All habitat monitoring data are collected and/or compiled at the bioregional scale, consistent with the Forest Plan as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a).

Habitats are the vegetation types (for example, early seral coniferous forest) or ecosystem components (for example, snags in green forest) required by an MIS for breeding, cover, and/or feeding. MIS for the Sierra Nevada National Forests represent 10 major habitats and 2 ecosystem components (USDA Forest Service 2007a), as listed in Table 1. These habitats are defined using the California Wildlife Habitat Relationship (CWHR) System (CDFG 2005). The CWHR System provides the most widely used habitat relationship models for California's terrestrial vertebrate species (ibid). It is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Habitat status is the current amount of habitat on the Sierra Nevada Forests. Habitat trend is the direction of change in the amount or quality of habitat over time. The methodology for assessing habitat status and trend is described in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

- **MIS Population Status and Trend**

All population monitoring data are collected and/or compiled at the bioregional scale, consistent with the Forest Plan as amended by the 2007 SNF MIS Amendment ROD (USDA Forest Service 2007a). The information is presented in detail in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Population monitoring strategies for MIS of the TNF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment ROD (USDA Forest Service 2007a). Population status is the current condition of the MIS related to the population monitoring data required in the 2007 SNF MIS Amendment ROD for that MIS. Population trend is the direction of change in that population measure over time.

There are a myriad of approaches for monitoring populations of MIS, from simply detecting presence to detailed tracking of population structure (USDA Forest Service 2001, Appendix E, page E-19). A distribution population monitoring approach is identified for all of the terrestrial MIS in the 2007 SNF MIS Amendment, except for the greater sage-grouse (USDA Forest Service 2007a). Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time. Presence data are collected using a number of direct and indirect methods, such as surveys (population surveys), bird point counts, tracking number of hunter kills, counts of species sign (such as deer pellets), and so forth. The specifics regarding how these presence data are assessed to track changes in distribution over time vary by species and the type of presence data collected, as described in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

● **Aquatic Macroinvertebrate Status and Trend**

For aquatic macroinvertebrates, condition and trend is determined by analyzing macroinvertebrate data using the predictive, multivariate River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. This monitoring consists of collecting aquatic macroinvertebrates and measuring stream habitat features according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005). Evaluation of the condition of the biological community is based upon the “observed to expected” (O/E) ratio, which is a reflection of the number of species observed at a site versus the number expected to occur there in the absence of impairment. Sites with a low O/E scores have lost many species predicted to occur there, which is an indication that the site has a lower than expected richness of sensitive species and is therefore impaired.

2. Selection of Project level MIS

Management Indicator Species (MIS) for the TNF are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 1. In addition to identifying habitat or ecosystem components (1st column), CWHR type(s) defining each habitat/ecosystem component (2nd column), and associated MIS (3rd column), Table 1 discloses whether or not the habitat of the MIS is potentially affected by the Sunny South Project (4th column).

Table 1. Selection of MIS for Project-Level Habitat Analysis for the Biggie Project

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component ¹	Sierra Nevada Forests Management Indicator Species (<i>Scientific Name</i>)	Category for Project Analysis ²
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow (<i>Passerella iliaca</i>)	2
Sagebrush	Sagebrush (SGB)	greater sage-grouse (<i>Centrocercus urophasianus</i>)	1
Oak-associated Hardwood & Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer (<i>Odocoileus hemionus</i>)	3
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler (<i>Dendroica petechia</i>)	2
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree (chorus) frog (<i>Pseudacris regilla</i>)	1
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail (<i>Oreortyx pictus</i>)	3
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail (<i>Oreortyx pictus</i>)	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S	Sooty (blue) grouse (<i>Dendragapus obscurus</i>)	3

	and P		
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl (<i>Strix occidentalis occidentalis</i>)	3
		Pacific marten (<i>Martes caurina</i>)	
		northern flying squirrel (<i>Glaucomys sabrinus</i>)	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker (<i>Picoides villosus</i>)	3
Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker (<i>Picoides arcticus</i>)	1

¹ All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

² **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.

Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.

Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

The fox sparrow, greater sage-grouse, yellow warbler, Pacific tree frog, and black-backed woodpecker will not be discussed further in this analysis because their respective MIS habitats or ecosystem components (i.e. shrubland, sagebrush, riparian, wet meadow, wet meadow, and snags in burned forest) do not exist in the project units and would not be affected by the project. Although shrubs occur in the forested habitats in the project area, they are not dominant in any of the units.

The MIS whose habitat would be either directly or indirectly affected by the Sunny South Project, identified as Category 3 in Table 1, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Sunny South Project are: aquatic macroinvertebrates, mule deer, mountain quail, sooty grouse, California spotted owl, Pacific marten, northern flying squirrel, and hairy woodpecker.

3. Bioregional Monitoring Requirements for MIS Selected for Project-Level Analysis

3.a. MIS Monitoring Requirements

The Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007a) identifies bioregional scale habitat and/or population monitoring for the Management Indicator Species for ten National Forests, including the TNF. The habitat and/or population monitoring requirements and results for TNF's MIS are described in the 2010 Sierra Nevada Forests Bioregional Management Indicator Species (SNF Bioregional MIS) Report (USDA Forest Service 2010a) and are summarized below for the MIS being analyzed for the Sunny South Project.

Habitat monitoring at the bioregional scale is identified for all the habitats and ecosystem components, including the following analyzed for the Sunny South Project: riverine & lacustrine; oak-associated hardwood & hardwood/conifer; riparian; early seral coniferous forest; mid seral coniferous forest; late seral open canopy coniferous forest; late seral closed canopy coniferous forest; and snags in green forest.

Bioregional monitoring is conducted for aquatic macroinvertebrates. An Index of Biological Integrity (IBI) and habitat condition and trend are measured by collecting aquatic macroinvertebrates and analyzed using the River Invertebrate Prediction and Classification System (RIVPACS) (Hawkins 2003) to determine whether the macroinvertebrate community has been impaired relative to reference condition within perennial water bodies. In addition, stream habitat features are measured according to the Stream Condition Inventory (SCI) manual (Frasier et al. 2005).

Population monitoring is conducted at the bioregional scale for fox sparrow, mule deer, yellow warbler, mountain quail, sooty grouse, California spotted owl, Pacific marten, northern flying squirrel, hairy woodpecker, and black-backed woodpecker. Distribution population monitoring consists of collecting presence data for the MIS across a number of sample locations over time (also see USDA Forest Service 2001, Appendix E).

3.b. How MIS Monitoring Requirements are Being Met

Habitat and/or distribution population monitoring for all MIS is conducted at the Sierra Nevada scale. Refer to the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a) for details by habitat and MIS.

4. Description of the Proposed Project

Proposed Action

The proposed action includes about 2,800 acres of treatments including: thinning of at-risk stands, mastication, prescribed burning, soil decompaction of non-system routes, commercial removal of dead and dying trees, and reforestation on NFS lands. The project includes two main project areas consisting of Sugar Pine Reservoir and Big Oak Flat.

Reduce Stand Density and Remove Insect-Killed Trees

Forest stands would generally be thinned from below. Live trees greater than 10 inches diameter at breast height (dbh) and up to 30 inches dbh would be considered for commercial thinning. A target stand density index (SDI) is below 230, with residual basal areas ranging from 80 to 125 square feet per acre in the plantations and 120 to 200 square feet per acre in the mixed conifer units. On a treatment area average, thinning treatments will retain at least 40 percent canopy cover in mature forest habitat and at least 50

percent canopy cover in mature forest habitat in California spotted owl Home Range Core Areas (HRCAs). No trees are identified for removal in the spotted owl or northern goshawk Protected Activity Centers (PACs).

Dead and dying beetle-infested trees would be felled and removed; these occur in a variety of patch sizes throughout the treatment areas. Patch sizes range from small patches of three to five trees to areas as large as 15 acres. Removing these trees will create gaps that will be reforested with a mixture of conifer species to increase the species diversity in the treated stands, improving their resilience to future insect and disease infestations.

Thinning would remove competing conifers within 10 feet of hardwood tree driplines to reduce competition. In some instances conifer would be removed from around individual hardwoods, while in other sites conifers would be thinned from around entire clumps of small patches of oaks. The focus of thinning would be on full-crowned, healthy hardwoods that are surrounded by small-diameter conifers.

The largest trees, with live crown ratios greater than 40 percent and free of damage and disease would generally be retained throughout the treatment areas. In the natural stands, retention would be in order of sugar pine, ponderosa pine, Douglas-fir, and incense cedar over white fir. In single-species dominated stands, the least represented species would be retained over the more predominate species to promote species diversity. Smaller trees would be thinned from around large, full-crowned conifers to provide additional growing space, to create conditions for rapid diameter growth, and to help ensure the survival of these relatively uncommon trees.

Unmerchantable dead and dying trees would be felled and piled to create gaps throughout the treatment areas. Thin green trees within one tree length from the edges of these pockets to remove trees that are likely infested with beetles. Snags and large woody debris within each unit would be retained to meet management requirements for soils and wildlife.

When cutting trees in recreation areas, all conifer stumps greater than 3 inches in diameter will be treated with a registered borate compound to reduce the probability of infection by *Heterobasidion* root disease (formerly referred to as annosus root disease). In all other areas, treat conifer stumps greater than 14 inches in diameter.

Conduct whole-tree, ground-based yarding would occur on approximately 2,455 acres. To control erosion and soil disturbance, downhill tractor activity will be limited to less than 35% slopes and uphill on less than 25% unless the leading end is suspended. Whole-tree cable-yarding would occur on 239 acres on slopes generally greater than 30%. Logs would be bunched in cable units with a feller-buncher prior to yarding to the landing. Cut material greater than four inches in diameter would be brought to the landing, with the exception of broken portions of logs and tops less than eight feet in length. Figure 1 shows the unit locations near Sugar Pine Reservoir, the Seed Orchard, and Big Oak Flat.

Riparian Conservation Areas (RCAs): In consultation with the West Zone Hydrologist and Fisheries Biologist, limited vegetation and fuels reduction treatments, including mechanical treatments, are proposed within the RCAs on a site-specific basis. This would occur where:

- topography or existing infrastructure allows equipment to enter without creating un-mitigatable disturbance;
- site-specific mitigations described in the Management Requirements section of this document would ensure these activities would not have adverse effects to watershed function and would be completed at the time of implementation; and
- treatments are consistent with the Forest Plan standards and guidelines and riparian conservation objectives (RCO's) described in the 2004 SNFPA ROD.

Archaeology site treatments: In consultation with the Archaeologist, treat approximately 2 acres in archaeology sites in units SP-8 and BF-1 to reduce the fuels build-up on-site. Hand cut small trees up to 6 inches dbh. Hand carry cut material or toss it past the flag line, scattering it for future burning.

Hazard Trees: Fall and leave on site or fall and remove trees posing an imminent hazard to vegetation and fuels management operations as well as public safety along NFS roads and trails within the treatment unit boundaries. Limit hazard tree treatments (either falling and leaving or falling and removing hazard trees) to trees that could impact the road and threaten public safety if they failed (generally within 200 feet of the road), and utilize the Forest Service Pacific Southwest Region's Hazard Tree Marking Guidelines to identify hazard trees. Fall identified hazard trees and leave in place or remove if commercially viable by yarding felled trees and/or endlining to the road. Limit ground-based equipment to slopes less than 30% for hazard tree removal operations.

Rust Resistant Sugar Pine Trees: Two rust resistant sugar pines (RRSP) are located within units SP-1 and SP-28. These trees are important because they were identified as seed trees that are immune to sugar pine rust, which has killed many trees. The RRSP protection strategy would further reduce stand density immediately surrounding the RRSP to promote the health of the individual trees and any adjacent conifers greater than 30 inches dbh, increasing the resilience of these trees to insects and disease. All trees less than 30 inches dbh within 25 feet of the drip line. In addition, the treatments for these RRSPs would reduce surface and ladder fuels that create hazardous conditions for tree survival during wildfires. The range of treatments may include fireline construction, shrub cutting, piling of slash and brush, pile burning, chipping, and removal of trees from sapling size up to 30 inches dbh, using ground-based equipment. Surrounding tree density would be reduced within 150 to 300 feet of the RRSP (between approximately 1.6 to 6.5 acres of vegetation treatments). Heavy duff and litter accumulations within two to three feet of the base of each tree would be raked away.

Table 2. Units with acres, basal area, canopy closure and fuels treatments

Unit	Plantation or Mixed Conifer	Acres	HRCA ¹	Target Canopy Closure (%)	Target Basal Area	Harvest and Fuels Treatments
BF-1	Mixed Conifer	314.9	Y	50	120	WTY ² , underburn
S-1	Plantation	219.2	N	40	100	Bunch WTY, underburn
SP-1	Plantation	194.7	N	40	100	WTY, underburn
SP-3	Mixed Conifer	65.3	N	40	100	WTY, underburn
SP-4	Plantation	79.0	Y	50	120	WTY, underburn
SP-5	Plantation	196.6	Y	50	120	WTY, underburn
SP-7	Plantation	181.6	Y	50	120	WTY, underburn
SP-8	Plantation	186.8	Y	50	120	WTY, underburn
SP-10	Plantation	176.2	Y	50	120	WTY, underburn
SP-11	Plantation	41.1	Y	50	120	WTY, grapple pile and burn, or jackpot pile and underburn
SP-12	Mixed Conifer	55.3	Y	50	160	WTY, underburn
SP-13	Mixed Conifer	118.3	Y(Partial)	50/ 40	100	WTY, masticate, underburn
SP-14	Mixed Conifer	43.4	N	NH	NH	Underburn
SP-15	Plantation	75.2	Y	50	120	WTY, underburn
SP-16	Plantation	39.1	Y	50	120	WTY, underburn
SP-18	Plantation	36.6	Y	50	120	WTY, underburn
SP-19	Plantation	50.8	Y	50	120	WTY, underburn
SP-20	Mixed Conifer /Plantation	20.5	Y	50	100	WTY, underburn
SP-21	Plantation	91.6	N	40	100	WTY, underburn
SP-22	Plantation	22.6	N	40	100	WTY, underburn
SP-23	Plantation	32.1	N	40	100	WTY, underburn
SP-23A	Plantation	20.3	N	40	100	WTY, underburn

Unit	Plantation or Mixed Conifer	Acres	HRCA ¹	Target Canopy Closure (%)	Target Basal Area	Harvest and Fuels Treatments
SP-24	Plantation	65.3	N	40	100	WTY, underburn
SP-26	Plantation	151.9	N	40	100	WTY, underburn
SP-27	Mixed Conifer	64.3	N	40	160	WTY, underburn
SP-28	Plantation	156.9	N	40	100	WTY, underburn
Total		2,700				

¹HRCA=Home Range Core Area; WTY = Whole tree yard

Table 3. Summary of proposed vegetation and fuels management activities

Treatment	Acres
Ground-based thinning and follow-up fuels treatment units	2,416
Cable thinning and follow-up fuels treatment units	239
No harvest units/ fuels treatments only	43
Total Acres	2,700

Fuels Treatments

In the harvest units, treat the non-commercial trees (4 to 9.9 inches dbh) by whole-tree yarding to the landing, pile and burn, or chip and remove the material as biomass. Bunch the material in cable units with a feller-buncher prior to yarding to the landing. Following the whole-tree yarding, evaluate these units for follow-up surface and activity fuel treatments. Treat fuels in the area with prescribed burning, such as underburning or hand pile and burn the piles. Grapple pile (using tracked-based equipment) and burn surface fuels on up to 25% of the harvested units prior to underburning, based on economic feasibility and existing surface fuel conditions. Pile and burn up to 25% of the harvested units emphasizing areas with pockets of dead or unmerchantable material. Piles may be burned under conditions where the fires could be allowed to spread and effectively underburn portions of the stand concurrently. Trees greater than 40 inches dbh and/or trees with previous fire (“cat-face”) scars may have duff and vegetation cleared away from their boles in order to provide additional protection during prescribed burning. A site and condition-specific prescribed fire plan would be completed prior to burning. Mechanically masticate brush and non-commercial trees in SP-13 and follow up with an underburn when the trees are able to withstand ground fire.

Unit SP-14 would not be harvested and no mechanical treatments are planned. Prescribed fire, mainly consisting of underburning, would be applied on 43 acres to reduce fuels and increase resilience to drought and insect infestation. Hand pile and burn if needed.

Soil Decompaction

Subsoil or rip compacted soil on approximately 9 miles (13 acres) of existing unauthorized routes, landings, main skid trails and temporary roads with equipment such as a winged sub-soiler or other tilling device to a depth of 12 to 18 inches. Break up the compaction and incorporate organic matter into the upper few inches of the soil column to allow rain and snowmelt to infiltrate the soil and get stored in the organic matter. Install drainage features, such as waterbars, as needed to prevent concentrated flows from causing erosion. Complete tillage/sub-soiling outside of the tree drip line so as not to impact root systems. Block off by placing cull log in front of road and cover log with soil.

Reforestation

In areas of concentrated mortality, reforest using a combination of site preparation, plant and release treatments. Site preparation would include tilling the top soil, as needed, to remove brush and other

competing vegetation to facilitate the planting effort. Up to 10 percent of the planted areas may need tilling where 20 percent or more of the reforestation area is covered by brush. Plant a variety of tree species: Douglas-fir, incense cedar, ponderosa pine, and sugar pine. Release for survival by manually grubbing a 5-foot radius around the planted trees until they are established above the competing vegetation. Reforestation efforts are planned for approximately 600 acres within the project area, although the number of acres needing reforestation could rise if tree mortality increases prior to implementation.

Management Requirements

Management requirements are designed to ensure compliance with current management direction and to reduce or prevent adverse effects of proposed actions to wildlife species. The management requirements shown below are incorporated into the proposed action and are discussed on a species specific basis in the effects analysis. The project includes additional measures to protect other resources that may affect wildlife, including measures for sensitive plants and to prevent the spread of noxious weeds.

Terrestrial Wildlife

1. Retain riparian vegetation and hardwoods, such as oaks, madrone, alder, willow, and cottonwood. Some riparian and hardwood vegetation may be removed for operability or safety. Reduce competing conifer trees under 30 inches dbh, where possible. Where possible, create openings around hardwoods to stimulate natural regeneration.
2. Where feasible and where it occurs in a stand, retain uncommon shrub species such as elderberry, redberry, coffeeberry, dogwood, and Sierra plum. Retain common shrub species in patches where it would not compromise fuels management goals.
 3. Retain four of the largest snags per acre larger than 15 inches dbh following Forest Plan management direction. Snag numbers can be averaged over 10 acres.
4. Implementation of stand thinning, mastication, piling, burning, or road maintenance will not occur in suitable habitat for spotted owls or northern goshawks with unknown occupancy until protocol surveys are completed. If spotted owls or northern goshawks are detected outside of designated PACs, protected territories would be established and managed according to the Forest Plan.
5. If federally-listed or sensitive species are detected in or within 0.5-mile of the project area prior to or during project activities, the District Wildlife Biologist will be notified and an appropriate LOP or other protective actions will be applied, as needed.
6. **Sensitive Species PAC, HRCA, and Canopy Cover Retention**
 - a. No mechanical removal of trees over 6 inches dbh would occur in spotted owl or northern goshawk PACs. Do not locate log processing landings for timber operations in northern goshawk or spotted owl PACs.
 - b. Within spotted owl home range core areas (HRCAs), where existing vegetative conditions permit, retain at least 50 percent canopy cover averaged within the treatment unit. Exceptions are allowed in limited situations where additional trees must be removed to adequately reduce ladder fuels, provide sufficient spacing for equipment operations, or minimize re-entry. Where 50 percent canopy cover retention cannot be met for reasons described above, retain at least 40 percent canopy cover averaged within the treatment unit. This applies to all or part of the following units: SP4-13, SP15-20, and BF-1
 - c. For all mechanical thinning treatments, design projects to retain all live conifers 30 inches dbh or larger. Exceptions are allowed to meet needs for equipment operability or safety.
 - d. For mechanical thinning treatments in mature forest habitat (defined as CWHR types 4M, 4D, 5M, 5D, and 6) outside Wildland Urban Interface (WUI) Defense Zones
 - Retain at least 40 percent of the existing basal area. The retained basal area should generally be comprised of the largest trees.

- Where available, retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches dbh within the treatment unit.
- Avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, canopy cover at 80 percent should not be reduced below 50 percent.)
- Where existing vegetative conditions are at or near 40 percent canopy cover, remove the material necessary to meet fire and fuels objectives.

7. Limited Operating Periods for Wildlife

- Maintain a yearly limited operating period (LOP) within 0.25-mile around known osprey nests during the breeding season (March 1 to August 31) unless surveys confirm they are not nesting. Prohibited activities include mechanical thinning, piling and/or burning, and road maintenance. Retain existing trees over 12 inches dbh within 200 feet of nest tree. If nest tree poses a hazard to roads or facilities, retain until after birds have left for the season. Bald eagles are not known to occur near Sugar Pine or Big Reservoirs, but if they nest prior to project implementation a 0.5-mile buffer would be subject to a LOP from January 1 to August 31.
- In California spotted owl Protected Activity Centers (PACs), an LOP from March 1st to August 15th will be maintained annually prohibiting mechanical activities such as thinning, piling and/or burning, and road maintenance within approximately 0.25-mile of the activity center unless surveys confirm that California spotted owls are not nesting.
- In northern goshawk PACs, an LOP from February 15th to September 15th will be maintained annually prohibiting mechanical activities such as thinning, piling and/or burning, and road maintenance within approximately 0.25-mile of the nest site unless surveys confirm that northern goshawks are not nesting.
- If federally-listed or sensitive species are detected in or within 0.5-mile of the project area prior to or during project activities, the District Wildlife Biologist will be notified and an appropriate LOP or other protective actions will be applied, as needed.

Water and Aquatic Resources

1. Riparian Conservation Areas

- Establish Riparian Conservation Areas (RCAs) for all aquatic features, as specified below. Ensure Riparian Conservation Objectives (RCOs) are met within RCAs by adhering to the Project Riparian Conservation Area (RCA) Guidelines. These guidelines specify the types of activities that can be conducted within RCAs and mitigation measures to minimize impacts to aquatic feature and riparian ecosystems. RCA widths are shown in Table 6.

Table 4. RCA Widths

Stream Type	Width of the Riparian Conservation Area
Perennial Streams	300 feet each side, measured from bank-full edge
Seasonal Flowing Streams	150 feet each side, measured from bank-full edge
Streams In Inner Gorge	Top of inner gorge
Meadows, lakes, and springs	300 feet from edge of feature or riparian vegetation, whichever is greater

- Establish a 100-foot “riparian buffer” zone along each side of perennial streams and special aquatic features, 50-foot “riparian buffer” along each side of intermittent streams and establish a

25-foot “riparian buffer” zone along each side of ephemeral streams. No harvest or ground based equipment is allowed in riparian buffers unless agreed to by a riparian specialist.

- c. Limit ground-based equipment to slopes less than 20% within all RCAs. To reduce ground disturbance created by equipment within RCAs, vary the routes the equipment uses and minimize turning of equipment.
- d. Within RCAs having slopes less than 20%, and outside of the riparian buffer, rubber-tired skidders or low ground pressure equipment may enter to retrieve logs but are limited to 1 to 2 passes over the same piece of ground. Note: Document on harvest cards if entering RCAs with high-ground-pressure equipment to retrieve logs.
- e. No new landings or roads will be located within RCAs. Consult with a riparian specialist before using an existing skid trail, landing, or road located within an RCA.
- f. Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist.
- g. Place rock on roads at stream crossings and segments within identified RCAs to reduce the impact of sediment delivery to associated stream courses. Place rock, slash, or certified NNIP free mulch at the outlets of rolling dips and/or waterbars to dissipate water where identified by road engineer and soil scientist, and/or hydrologist.

2. Water Source Use

- a. Armor road approaches as necessary from the end of the approach nearest a stream for a minimum of 50 feet, or to the nearest drainage structure.
- b. Where overflow runoff from water trucks or storage tanks may enter the stream, effective erosion control devices shall be installed.
- c. All water-drafting vehicles shall be checked daily and shall be repaired as necessary to prevent leaks of petroleum products from entering RCAs or water.
- d. The operators of water-drafting vehicles shall have petroleum spill kits and know how to effectively deploy the hazardous response materials/spill kits. Dispose of absorbent pads according to the Hazardous Response Plan.
- e. Survey all proposed drafting locations for sensitive and listed amphibians and receives approval from a biologist prior to use. Use drafting devices with 2-mm or less screening and place hose intake into bucket in the deepest part of the pool. Use a low velocity water pump and do not pump ponds to low levels beyond which they cannot recover quickly (approximately one hour). If a sensitive or listed amphibian is sighted within the project area, cease operations in the sighting area, and inform a Forest Service aquatic biologist of the sighting immediately.
- f. Document each load of water drafted from the Sugar Pine Reservoir in terms of gallons per project per truck per day and provide a written report to the Public Services Officer every two weeks.
- g. Any spill into the water shall be immediately contained and reported to the Forest Service dispatch.
- h. Leave one lane of travel at the Sugar Pine Boat Ramp open for recreation use during drafting.
- h. No water drafting from Big Reservoir without owner’s written permission.

3. Prescribed Fire Activities

- a. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within riparian buffers, unless otherwise agreed by the Hydrologist, Botanist, or Aquatic Biologist. Fire may back into the riparian buffer.
 - b. Place burn piles a minimum of 100 feet away from perennial and intermittent streams and 25 feet from ephemeral streams. Locate piles outside areas that may receive runoff from roads.
 - c. Within CRLF habitat (less than 5,200 feet and within 300 feet of perennial or intermittent streams), prescribed burning would not take place during rain or within 4 days following a rain event depositing more than 0.25 inches. Directional hand pile lighting – all hand piles must be ignited on only one side of the pile, not to exceed half the circumference of the pile, on the side furthest from the nearest aquatic feature.
4. **Limited Operating Period.** During the wet season (defined as starting with the first frontal rain system that deposits a minimum of 0.25 inches of rain after October 15 and ending April 15), do not perform mechanical operations within 300 feet of suitable habitat for California red-legged frog (e.g. intermittent or perennial streams, ponds, springs, and seeps).
 5. Report incidental detections of federally-listed and sensitive aquatic species prior to or during project implementation to the District Fisheries Biologist for protection in accordance with management direction for the Tahoe National Forest.
 6. If any California red-legged frog is found during the pre-activity survey or at any time during the Project, vacate the immediate area and leave the frog alone. No activity will occur in that area until such time as the frog has left the area on its own. Do not handle California red-legged frogs during any activity related to the Project.
 7. To reduce the potential for adverse cumulative watershed effects, implement state certified Best Management Practices (BMPs). Site specific BMPs applicable to this project are located in project record file.

Soils

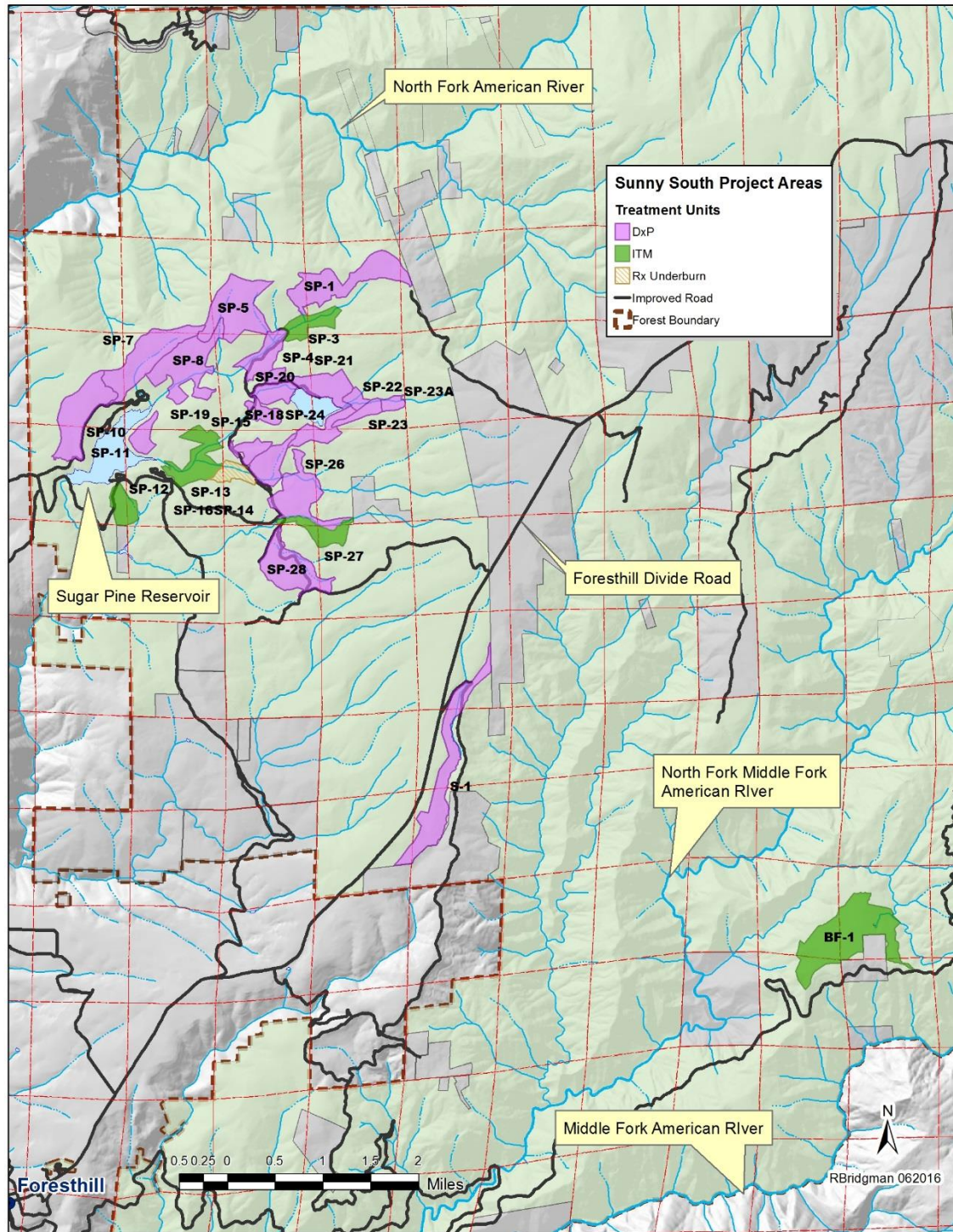
1. Unless large down woody debris exceeds 10 tons per acre, retain down large woody at a rate of 5 of the largest downed logs per acre. Preference is for large cull logs 20 inches or more in diameter and more than 40 cubic feet in volume. Avoid ignition of large woody debris in units slated for underburning. Avoid existing large woody debris and leave additional coarse wood on the ground (i.e. not grind it into the ground) in mastication areas.

Off-road Use (Facility Management)

1. Where brush, saplings or other live or dead vegetation exists, provide minimum 10-foot buffers on all sides of all recreation facilities, dispersed areas, and all designated NFS trails and NFS roads, and County roads for all vegetation management activities including post-harvest treatments. Exclude equipment from the buffer except at designated crossings. Consult trails manager or recreation officer at all phases of vegetation management operations, including pre-op meeting.
 - a. The width of the buffer may vary depending on the density of vegetation in the site-specific area, the denser the vegetation, the narrower the buffer may be. Screening will be set back 30 to 70 feet in discontinuous segments with gaps less than 50 feet in length and staggered so as to limit visibility into the stand. Features such as cut-banks or rock outcrops which prevent visibility or vehicle access into a stand may be included as part of roadside screening.
 - b. Flag the buffer prior to operations in designation by prescription (DxP) units.
 - c. In individual tree mark (ITM) units, do not mark merchantable material within the buffer.
 - d. Maximize protection of vegetated buffers during management treatments.

- e. To maintain the effectiveness of vegetated buffers, treat activity fuels by hand piling and burn (no mechanical piling) within 50 feet of ML 3, 4, and 5 roadsides.

Figure 1. Sunny South Insect Treatment Project



4.a. Comparison of the Effects of the Project to MIS Habitat

Listed in Table 5 below are the current and predicted post project California Wildlife Habitat Relationship (CWHR) vegetation classifications that are used throughout this document to describe changes to selected MIS habitat types. These classifications describe the dominant vegetation type (tree species), tree size, and canopy cover. The MIS are defined in terms of CWHR habitat types important to each species throughout the Sierra Nevada Bioregion as described previously. By showing changes to important habitat attributes i.e. canopy cover, we can quantify effects to habitat. By quantifying changes to CWHR classifications we can identify the status and trends of those habitat types within the proposed project and within the bioregion. Changes to CWHR classifications are discussed for all MIS habitat components affected by the proposed project.

The spatial extent (totaling an estimated 38,189 acres) of the analysis area extends 1.5 miles beyond the maximum spatial extent of proposed project treatments to include habitats that MIS might use that overlap with the project, but not so large as to potentially mask effects to habitat from the Sunny South Project. Table 4 lists the habitat within the project area and the analysis area and the predicted effects of the project to that habitat. Hazard tree removal would include the removal of incidental trees along roads within units, which would not alter the overall CWHR classification in those areas.

Table 5. Summary of Changes to MIS Habitat Extent within the Project and the Analysis Area

MIS Habitat	Pre-Treatment Habitat/ Project Area	Pre-treatment Habitat/ Analysis Area
Riverine & Lacustrine	0.08 acres/ 17.3 miles	261 acres/ 87.5 miles
Oak-associated Hardwood & Hardwood/conifer	455	13,853
Early Seral Coniferous Forest	109	1,909
Mid Seral Coniferous Forest	1,176	10,896
Late Seral Open Canopy Coniferous Forest	37	486
Late Seral Closed Canopy Coniferous Forest	668	9,035

5. *Effects of Proposed Project on the Habitat for the Selected Project-Level MIS*

The following section documents the analysis for the following ‘Category 3’ species: aquatic macroinvertebrates, mule deer, mountain quail, sooty grouse, California spotted owl, Pacific marten, northern flying squirrel, and hairy woodpecker. The analysis of the effects of the Sunny South project on the MIS habitat for the selected project-level MIS is conducted at the project scale. The analysis used the following habitat data: stand exam data in treatment units, aerial photo derived vegetation maps (based on aerial photography taken in 2000 and 2005, updated after the 2013 American Fire), and ground verification, and preliminary LiDAR data from 2014. GIS analysis was conducted using the most recent Tahoe National Forest Vegetation layer as updated.

Detailed information and cumulative effects at the bioregional scale on MIS is derived from in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a).

Riverine/Lacustrine Habitat (Aquatic Macroinvertebrates)

Habitat/Species Relationship

Aquatic or Benthic Macroinvertebrates (BMI) were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. They have been demonstrated to be very useful as indicators of water quality and aquatic habitat condition (Resh and Price 1984; Karr et al. 1986; Hughes and Larsen 1987; Resh and Rosenberg 1989). They are sensitive to changes in water chemistry, temperature, and physical habitat; aquatic factors of particular importance are flow, sedimentation, and water surface shade.

Project-level Effects Analysis – Riverine/Lacustrine Habitat

Habitat Factor(s) for the Analysis: Flow, sedimentation, and water surface shade.

Current Condition of the Habitat Factor(s) in the Analysis Area: The spatial extent (totaling an estimated 38,126 acres) of the analysis area is defined as all watersheds that contain project units, which is within the North Fork American hydrologic unit code (HUC) 8 watershed. There are two reservoirs (Lacustrine habitat) within the analysis area; Sugar Pine Reservoir and Big Reservoir. Riverine habitats (perennial and intermittent streams) within the analysis area, totaling approximately 106 miles, of which 27 miles are contained within project units, and are comprised of many small and medium-sized montane streams. Surface flows are intermittent to perennial depending upon the type (e.g. rain and/or snow) and amount of annual precipitation, and relative position within each watershed. Flow volumes in all but the main stems are generally less than two cubic feet per second (cfs). Flow of the main stems may exceed several hundred cfs during peak flows. Intermittent montane streams within the analysis area primarily transport small materials (e.g. gravels and fine sediments) due to their limited energy potential while the main stem perennial streams will transport larger materials. Water surface shade along montane streams varies greatly throughout the analysis area. Habitat factors selected for aquatic macroinvertebrates within the analysis area are mainly impaired by past wildfires that have affected flow, sedimentation, and shading.

Direct and Indirect Effects to Habitat: Within the footprint of the proposed activities, there are approximately 27 miles of riverine habitat. Flows in intermittent and perennial streams (riverine habitat) are not expected to be affected unless annual precipitation exceeds water uptake in treated stands and only until water uptake from re-growth matches available water; the effect is expected to be non-measurable to slight and last only through the short term (1-5 years). Vegetation management activities (e.g. thinning and underburning) are expected to cause soil disturbance and (where mechanical equipment is used) compaction within 300 feet of intermittent or perennial streams; however, sedimentation is not expected to be measurably affected because of spatial and temporal protective measures in the Sunny South project RCA guidelines and management requirements (see the Sunny south Project Decision Memo for a list of management requirements). These measures include riparian buffers limiting mechanical operations.

Effects to sedimentation are not expected because RCA guidelines and management requirements would be in place to prevent such effects.

Shading would be reduced immediately following project implementation in treatment areas, but is expected to recover over the medium to long term (10 years +). Riparian buffers and canopy retention

standards would maintain stream shading while adjacent forested stands develop along trajectories expected to improve in-channel stream shading and aquatic habitat development over the long term.

Cumulative Effects to Habitat in the Analysis Area: The spatial extent (totaling an estimated 38,126 acres) of the analysis area is defined as all watersheds that contain project units, which is within the North Fork American hydrologic unit code (HUC) 8 watershed. This spatial extent was chosen to encompass connected watersheds that may be effected as a result of the proposed project without extending so far as to potentially mask effects on lacustrine/riverine habitats from the Sunny South Project when combined with past, present, and reasonably foreseeable future actions. The analysis area is temporally defined to extend 20 years before and after the present; in correlation with the estimated longevity of vegetation treatments.

Past timber harvests, fuel reduction projects, and wildfires (acres shown in Table 6) have occurred over most of the analysis area, which has periodically affected the timing and volume of flows by reducing canopy closure and evapotranspiration (resulting from reduced tree density and associated water uptake), while increasing stormflows and sediment movement. Reductions in canopy closure likely altered the timing of flows (e.g. increasing the rate of snowmelt and causing peak flows to occur earlier in the season) while reductions in evapotranspiration may have increased the volume of surface flows if annual precipitation exceeded water uptake in treated stands. The magnitude and duration of these effects likely varied by treatment (e.g. greater magnitude and longer duration in aggressively harvested areas and severely burned areas than in lightly thinned or burned areas) and are generally thought to be slight in magnitude (e.g. flow volume would change subtly) and to last until re-growth began affecting available water.

A 38,189-acre wildlife analysis area extends 1.5 miles beyond the project units and is used in this Biological Evaluation to analyze cumulative effects to Forest Service sensitive species and their habitats, including effect from past, present, and reasonably foreseeable future actions. This area is large enough to encompass the known home ranges of species being analyzed, yet not so large as to mask any potential effects of the proposed action. Of this area, approximately 28,257 acres are on the TNF; the remaining 9,932 acres are privately owned.

Past, present, and reasonably foreseeable future actions on forest land that have or will occur within the analysis area over the last 20 years (1996-2016) or next 20 years (2016-2036), and a general description of the actions' effects on wildlife habitats are summarized in the table below. The footprint of activities on forest land that have occurred over the past 20 years is about 12,441 acres or 44% of the 38,139 acre analysis area.

The analysis area includes the Foresthill Seed Orchard, located alongside the Foresthill Divide Road, and consists of approximately 430 acres. The Seed Orchard is intensively managed for particular conifer genetics and the resulting cone crops. This area receives ongoing management, including understory vegetation control, planting, fertilization, weeding, pruning, pre-commercial and commercial thinning, even-aged harvest, chipping, gopher and insect control, pile burning, and low-intensity understory burning..

Other projects in the analysis area include the recent Deadwood Vegetation Management and Fuels Reduction Project, which was about 4,000 acres, including commercial and precommercial thinning, fuels reduction, fuelbreaks, prescribed burning, and roadwork; the Oliver Insect Salvage project, Bear Wallow Thinning project, Big Reservoir project, End of the World project, Giant project, Iowa Hill Shaded Fuelbreak, and the Shirttail Succor Oak Fuel Reduction project. Most of these projects included a combination of commercial and precommercial thinning fuels reduction, and prescribed burning. The Sugar Pine Reservoir area receives heavy recreational use and small maintenance and improvement

projects associated with the established campgrounds, OHV trails, and the reservoir, which provides residential water for the community of Foresthill. The various types of treatments outside the Seed orchard are quantified below in Table 6.

It is likely that other projects will occur within the Analysis Area within the next 20 years but they have not yet been developed and therefore cannot be quantified.

Table 6. General Cumulative Effects: Summarized Effects of Past Projects

Activity	Effects of Past Actions	Acres
Commercial Thinning	Reduction in canopy cover resulting in reduced habitat quality and some cases habitat quantity for late-successional wildlife species including marten, goshawk, and spotted owl. Reduces competition among trees, increases vigor and resilience.	6,080
Private Land Timber Harvest	A variety of possible timber harvest techniques/ objectives, but typically more overstory removal than on TNF, reducing overstory canopy cover and increasing early seral habitat for deer and mountain quail.	2,700
Pre-Commercial Thinning	Removal of trees <6-10 inch dbh creating a more open understory tree layer. Reduces competition among trees, increases vigor and resilience.	6,135
Fuel Reduction of shrubs and small diameter trees	More open understory, reducing habitat available for small mammal and bird species used for resting, foraging, and/or nesting in the short term. May benefit goshawk with more open flight corridors within the tree understory. No changes to overstory canopy cover.	3,948
Group Selection-removal of all trees <30" dbh on up to 1 acre	Increase in habitat for early seral species, increase in forest seral stage diversity across units, likely not to alter overall suitability of habitat for mature to late-seral forests species.	719
Tree Planting	Reduction in the timeframe that shrub dominated habitats will return to mid and late seral forests.	4,381
Site Preparation for planting	Clearing of shrub vegetation that would compete with tree seedlings. Some loss of understory/ shrub habitat with similar effects to fuel reduction.	2,170
Seed Tree Cut	Long-term removal/loss of late-successional habitat for marten, goshawk, spotted owl, increased early seral habitat for deer and mountain quail.	555
Thinning for Hazardous Fuels Reduction	Short-term reduction in foraging habitat quality for late-seral species, such as goshawk, spotted owl, and Pacific marten, Long-term benefits from increase forest resiliency.	918
Tree Release and Weed	More open understory potentially affecting small mammal and bird species in the short term. No affects to overstory canopy cover.	6,356
Underburning	More open understory resulting in reduced habitat quality and quantity for some small mammal and bird species in the short term. No affects to overstory canopy cover.	3,416
Roadside Hazard Tree Removal	Removal/loss of a minimal number of trees and snags. Should not affect canopy cover or change overall habitat structure. Removal of a minimal number of snags and dying trees has a slightly negative effect to habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	75
Wildfire	Codfish Fire (2003), Ralston Fire (2006), Peavine Fire (2008), American Fire (2013)	3,629

Past projects overlapped extensively; particularly if areas were harvested or thinned under various prescriptions they may have then undergone multiple treatments such as pre-commercial thinning followed by commercial thinning and underburning all within the same footprint. The past vegetation management activities on the TNF were generally aimed at reducing small-to-medium diameter materials (e.g. shrubs and trees less than 24 inches dbh) for fuel reduction; however, some larger diameter (up to 30 inches dbh) trees typically were removed, particularly during salvage, commercial thinning, clear cutting, group selection, seed tree, and overstory removal prescriptions.

Most of the recent vegetation management activities in natural stands are focused on forest health and fuels reduction treatments that protected and maintained large trees, retention of canopy cover, snags, and down logs for wildlife, while reducing the risk of stand-replacing catastrophic wildfires. Activities in plantations tend to include more aggressive thinning to ensure the continued survival of planted trees.

Together these projects resulted in various degrees of short-term habitat change at the patch-scale, but overall project design standards were to maintain suitable habitat for the goshawk, marten, and spotted owl at the stand or landscape scale.

In the past 20 years the American Fire (2013) affected about 330 acres and the Ralston Fire (2007) affected another 2,480 acres within the analysis area, both near the Big Oak Flat area, coming from nearby canyons. In burned areas that were salvage logged, habitat attributes important to many species such as large logs and snags were greatly reduced. The heavy use and steep river canyons have resulted in an extensive fire history in the surrounding landscape. The Volcano Fire (1960) affected 18,293 acres in the analysis areas, and led to extensive reforestation efforts and dense stands of pines including those in the project area, that have required recent thinning efforts. Approximately 5,778 acres of Volcano plantations are within the analysis area and of those, about 915 acres of plantations are within the proposed Sunny South project. Prior to the Volcano Fire, much of the remaining areas in the analysis area burned in 1924 near Big Oak Flat and 1936 near Sugar Pine Reservoir; these areas have largely recovered and resemble natural stands more than the Volcano plantations.

Private land accounts for 9,932 acres or 26% of the analysis area. According to the THP records database referenced (<ftp://ftp.fire.ca.gov/forest/>) which included treatments back to 1997, 2,700 acres have been treated with the analysis area. Fire salvage is not recorded in the database as it is considered an emergency action but some of the private lands that burned in the Ralston fire within the analysis area that burned at moderate to high severity may have been logged.

Sedimentation likely increased slightly and temporarily with past timber harvest, although recent management practices including riparian buffers generally prevent or greatly mitigate the potential for sedimentation. Prescribed burning is unlikely to have measurably affected sedimentation due to the low intensity of the fire and the abundance of remaining ground and canopy cover immediately after burns. Wildfires occurring over the last 20 years have burned 3,629 acres of the 38,126-acre analysis area, including 60 acres that burned at high intensity. Burned areas, particularly severely burned areas, have temporarily caused a large increase in sedimentation within and downstream of burned areas. Sediment entering streams as a result of the Codfish (2003), Ralston (2006), Peavine (2008) and American (2013) fires has likely reduced substantially as soil stabilized and vegetation recovered.

Stream shading has been affected very little by vegetation projects occurring over the last 20 years because riparian buffers retain vegetation adjacent to streams. Past wildfires have greatly reduced or eliminated vegetation adjacent to a relatively small percentage of streams in the analysis area. In contrast to timber harvesting and prescribed burning, wildland fire exclusion has likely reduced flows and sedimentation and increased stream shading by increasing vegetative cover.

Reasonably foreseeable future actions (Table 7) proposed within the analysis area include the Cuckoo Fuel Reduction and Vegetation Management Project and the Biggie Fuel Reduction and Vegetation Management Project. The Cuckoo project is a vegetation management project under development that consists of similar stand thinning and fuel reduction activities. Both the Biggie and Cuckoo projects are expected to have similar effects to the proposed action as described above.

Hazard tree removal is not expected to affect habitat factors for aquatic macroinvertebrates during the 20 year analysis period due to the limited number of trees that will be removed that would have potentially fallen into streams, and the period of time it will take for planted trees to increase stream shading. Effects to habitat factors of the aquatic macroinvertebrates as a result of the Biggie and Cuckoo projects are expected to be similar to those of the Sunny South project proposed action. Minimal and short term increases in sedimentation, increased flow, and a decrease in stream shading are not expected to be measurably affected. Short term effects of the Biggie and Cuckoo projects are not expected to coincide

with the Sunny South project as timelines for expected implementation would not overlap. All activities proposed would follow Riparian Conservation Objectives and management requirements which include stream buffers.

Table 7. Future Projects within the Sunny South Analysis Area.

Activity	Reasonably Foreseeable	Acres
Roadside Hazard Tree Removal	Removal/loss of a minimal number of trees and snags. Should not affect canopy cover or change overall habitat structure. Removal of a minimal number of snags and dying trees has a slightly negative effect to habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	145
Commercial thinning	Reduction in canopy cover resulting in reduced habitat quantity for late-successional wildlife species including marten, goshawk, and spotted owl.	133
Underburning	More open understory resulting in reduced habitat quality and quantity for small mammal and bird species in the short term. No affects to overstory canopy cover.	133
OHV Reroutes	Replacing routes with excessive erosion with better routes. Minor loss of vegetation and habitat fragmentation with additional associated disturbance; somewhat offset by restoration and eliminated use on closed routes.	1.4 miles (net)
Sugar Pine Reservoir Inundation	Proposed raising of lake level at Sugar Pine Reservoir; estimated 38 acres of Sierra mixed conifer, 2 acres of emergent vegetation, and 2 acres of open chaparral habitat.	42
Cattle Grazing	Ongoing and revised grazing allotment in the Big Oak Flat area affects herbaceous and shrub layer, reducing cover and forage for various wildlife species. Revised plan would reduce impacts to riparian habitats (monitored sites, fencing, and other measures).	5,932

Cumulative Effects Conclusion: Implementation of the proposed action would have non-measurable to slight effects on flow, sedimentation, and stream shading and thus very little effect on lacustrine and riverine habitats. The proposed action combined with the effects of past, present, and reasonably foreseeable future actions, would not result in adverse cumulative effects to riverine or lacustrine habitats.

Summary of Aquatic Macroinvertebrate Status and Trend at the Bioregional Scale

The TNF Forest Plan (as amended by the SNF MIS Amendment) requires bioregional-scale Index of Biological Integrity and Habitat monitoring for aquatic macroinvertebrates; hence, the lacustrine and riverine effects analysis for the Biggie Project must be informed by these monitoring data. The sections below summarize the Biological Integrity and Habitat status and trend data for aquatic macroinvertebrates. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat and Index of Biological Integrity Status and Trend: Aquatic habitat has been assessed using Stream Condition Inventory (SCI) data collected since 1994 (Frasier et al. 2005) and habitat status information from the Sierra Nevada Ecosystem Project (SNEP) (Moyle and Randall 1996). Moyle and Randall (1996) developed a watershed index of biotic integrity (IBI) based on distributions and abundance of native fish and amphibian species, as well as extent of roads and water diversions. According to this analysis, seven percent of the watersheds were in excellent condition, 36 percent were in good condition, 47 percent were in fair condition and nine percent were in poor condition.

Sierra Nevada MIS monitoring for aquatic (benthic) macroinvertebrates (BMI) was conducted in 2009 and 2010 (Furnish 2010). Benthic macroinvertebrates were collected from stream sites during both the 2009 and 2010 field seasons according to the Reachwide Benthos (Multi-habitat) Procedure (Ode 2007). The initial BMI data from 2009 and 2010 found 46% (6 of 13) of the surveyed streams indicate an impaired condition and 54% (7 of 13) indicate a non-impaired condition (see USDA Forest Service 2010a, Table BMI-1). This is similar to the IBI conditions estimated by Moyle and Randall (1996).

Therefore, current data from the Sierra Nevada indicate that status and trend in the RIVPACS scores appears to be stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Aquatic Macroinvertebrates

Habitat Trend: Because implementation of the project would result in slight to non-measurable changes in flow, sedimentation, and stream shading, the Sunny South Project is not expected to alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat (Mule deer)

Habitat/Species Relationship

The mule deer was selected as the MIS for oak-associated hardwood and hardwood/conifer in the Sierra Nevada, comprised of montane hardwood (MHW) and montane hardwood-conifer (MHC) as defined by the California Wildlife Habitat Relationships System (CWHR) (CDFG 2005). Mule deer range and habitat includes coniferous forest, foothill woodland, shrubland, grassland, agricultural fields, and suburban environments (CDFG 2005). Many mule deer migrate seasonally between higher elevation summer range and low elevation winter range (Ibid). On the west slope of the Sierra Nevada, oak-associated hardwood and hardwood/conifer areas are an important winter habitat (CDFG 1998).

Project-level Effects Analysis - Oak-Associated Hardwoods and Hardwood/Conifer Habitat

Habitat Factor(s) for the Analysis: (1) Acres of oak-associated hardwood and hardwood/conifer habitat [CWHR montane hardwood (MHW), montane hardwood-conifer (MHC)]; (2) Acres with changes in hardwood canopy cover; and (3) Acres with changes in CWHR size class of hardwoods.

Current Condition of the Habitat Factor(s) in the Analysis Area: The spatial extent (totaling an estimated 38,189 acres) of the analysis area extends 1.5 miles beyond the maximum spatial extent of proposed project activities (Fig. 2) to include habitats that mule deer might use that overlap with the project, but not so large as to dilute project-related effects on mule deer habitat. An estimated 13,853 acres exist within the analysis area, of which approximately 455 acres of oak-associated woodlands and hardwood-conifer habitats are located within the project footprint (3% of the oak woodland in the total analysis area). Black oaks (*Quercus kelloggii*) are a component in many stands dominated by conifers but are dominant in particular areas, including Big Oak Flat, parts of the northern units at Sugar Pine Reservoir (SP-5,7,8, and 10), and part of unit S-1. Other hardwoods such as dwarf tan oak (*Notholithocarpus densiflorus* var. *echinoides*) and madrone (*Arbutus menziesii*) occur in conifer-dominated stands, usually as an understory. Very few hardwoods occur in the dense ponderosa pine plantations established after the Volcano Fire in 1960.

Proposed Action

Direct and Indirect Effects to Habitat: An estimated 455 acres of oak-associated woodlands and hardwood-conifer habitats would be affected by the proposed action. The oak woodland would be subjected to the thinning of conifers, pile burning, and underburning. Most units would receive fuels treatment after commercial harvest activities.

The proposed treatments in oak and conifer-dominated stands are intended to retain existing oaks and improve their condition by removing competing conifers under 30" dbh. Conifer thinning around oaks would also occur in stands dominated by conifers, which is expected to increase the resiliency and habitat value of oak habitat in both conifer and oak stands. The thinning of conifers in these habitats would

reduce canopy cover, changing stand composition in most units to between 40-50% canopy, resulting in more of the canopy being made up by oak trees. The existing oaks would be retained and have more space, light, nutrients, and water to grow.

Cumulative Effects to Habitat in the Analysis Area: Past timber harvesting, prescribed burning, and wildland fire exclusion activities have affected oak-associated hardwood and hardwood/conifer habitats in the analysis area. Fire suppression and managing for dense, old forest habitats typically crowd oaks with dense conifer overstory; however, in the analysis area the two large wildfires have killed many conifers, whereas most oaks, while easily damaged by fire, will resprout from the roots and have an advantage unless reforestation activities occur. Young oaks and resprouting oaks do not provide substantial acorn crops (mast) for foraging animals such as deer, although they may provide important cover and forage from leaves. Oaks may take 75 years to reach a size to produce substantial acorn mast, although resprouting oaks after fire grow more rapidly, using the existing root system. Oaks are not typically targeted in other management activities, and so typically are left during fuels reduction, mastication, and commercial harvest activities. Some oaks are removed if they pose a hazard to roads or other uses.

The projects described in Table 6 and 7 would generally benefit oak woodland habitat; the exception is reforestation activities and prescribed burning, which may have adverse effects on individual trees. The Forest Plan and updated prescriptions designed to incorporate Sierra forest strategies (North et al 2009) favors oaks by creating openings around oaks, much like the Sunny South project. The various plantations are likely to be managed with consideration to protecting and enhancing oaks that occur within them. Areas within private timberlands, while applying relatively aggressive harvest prescriptions, tend to retain oaks where they occur within a stand.

Many of the treatments within the recent (2013) American Fire have already occurred, while others are ongoing and will continue for several years. Very little of the associated projects occur within the analysis area, but in general, wildfires set oak trees back to a rapidly resprouting root system that grows quickly in the absence of dead or harvested conifers. These Resprouting oaks do not provide the structural complexity or acorn mass of mature trees, but are likely to compete well without large overstory conifers.

The planned Cuckoo and Biggie projects include other treatments than the Sunny South project, including precommercial thinning in plantations, but both projects have similar stand thinning and fuel reduction activities. These projects are expected to contribute to cumulative beneficial effects to oak woodlands. Wildland fire suppression is expected to continue with affects as described for past actions.

Cumulative Effects Conclusion: The greatest adverse effect to oak woodland in the analysis area resulted from the Volcano Fire, which was reforested with dense pine plantations but little management on behalf of oaks, resulting in very little hardwood component in many of the plantations. The more recent fires were also a set-back for oak woodlands, but they are expected to fare better with more consideration of the importance of oaks in Sierran mixed conifer ecosystems. The proposed project, in conjunction with other past, present, and foreseeable projects are expected to benefit oak woodland by recognizing their importance and continuing to retain oaks and thin small conifers near oaks. While other vegetation treatments have been relatively limited in the oak woodlands, they also tend to reduce conifer cover while retaining oaks. The planned treatments in 455 acres of oak woodland as part of the Sunny South project would contribute to this effect, which would similarly help to offset the effects of dense conifers associated with historic and ongoing fire suppression. These treatments will continue to affect canopy cover and size class through and beyond the timeframe of the analysis period. The generally beneficial effects of the proposed action, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in any loss of or long term adverse cumulative effects to oak-associated hardwood and hardwood/conifer habitats.

Summary of Mule Deer Status and Trend at the Bioregional Scale

The TNF Forest Plan (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mule deer; hence, the oak-associated hardwood and hardwood/conifer effects analysis for the Sunny South Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mule deer. This information is drawn from the detailed information on habitat and population trends in the 2010 Sierra Nevada Forests Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend: There are currently 808,006 acres of oak-associated hardwood and hardwood/mixed conifer habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 5% to 7% of the acres on National Forest System lands).

Population Status and Trend: The mule deer has been monitored in the Sierra Nevada at various sample locations by herd monitoring (spring and fall) and hunter survey and associated modeling (CDFG 2007, 2010). California Department of Fish and Game (CDFG) conducts surveys of deer herds in early spring to determine the proportion of fawns that have survived the winter, and conducts fall counts to determine herd composition (CDFG 2007). This information, along with prior year harvest information, is used to estimate overall herd size, sex and age ratios, three-year average populations, and the predicted number of bucks available to hunt (CDFG 2007, 2010). These data indicate that mule deer continue to be present across the Sierra Nevada, and current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in some herds or Deer Assessment Units, the distribution of mule deer populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mule Deer Trend: The change in canopy closure and/or size class of 455 acres or less out of 13,853 acres of oak-associated hardwood and hardwood/conifer habitats in the Sunny South Project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion.

Early and Mid Seral Coniferous Forest Habitat (Mountain quail)

Habitat/Species Relationship

The mountain quail was selected as the MIS for early and mid seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. Early seral coniferous forest habitat is comprised primarily of seedlings (<1" dbh), saplings (1"-5.9" dbh), and pole-sized trees (6"-10.9" dbh). Mid seral coniferous forest habitat is comprised primarily of small-sized trees (11"-23.9" dbh). The mountain quail is found particularly on steep slopes, in open, brushy stands of conifer and deciduous forest and woodland, and chaparral; it may gather at water sources in the summer, and broods are seldom found more than 0.8 km (0.5 mi) from water (CDFG 2005).

Project-level Effects Analysis – Early and Mid Seral Coniferous Forest Habitat

Habitat Factor(s) for the Analysis: (1) Acres of early (CWHR tree sizes 1, 2, and 3) and mid seral (CWHR tree size 4) coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, 3, and 4, all canopy closures]; (2) Acres with changes in

CWHR tree size class; (3) Acres with changes in tree canopy closure; and (4) Acres with changes in understory shrub canopy closure.

Current Condition of the Habitat Factor(s) in the Analysis Area: The spatial extent of the analysis area extends 1.5 miles (totaling an estimated 38,189 acres) beyond the maximum spatial extent of proposed project activities (Fig. 2) to include habitats that mountain quail might use that overlap with the project, but not so large as to hide the effects of the Sunny South Project. A total of approximately 12,805 acres of early and mid seral coniferous forest habitats [1909 acres (15%) of early seral and 10,896 acres (85%) of mid seral] are located within the analysis area.

Proposed Action

Direct and Indirect Effects to Habitat: Although 109 acres of early seral habitat would be treated in the project areas, very little change in early seral forest acres would occur because these areas are already relatively open and brushy; nonetheless, these areas would become somewhat more open after treatment, particularly after fuels treatments, which tend to reduce densities of small trees and brush. Because the early seral stands are generally uniformly-sized trees in plantations, thinning would not affect average diameter size. Information regarding existing understory shrub canopy closure is not available so effects to this component are not quantifiable. Thinning, mastication, and prescribed burning typically reduce understory shrub canopy closure where present.

Most of the 50-year old Volcano plantations consist of 50-year old ponderosa pines and thinning proposed in 1,176 acres of mid seral forest areas would largely affect these areas, leaving any residual large trees and providing more space for the fast-growing midseral trees. The thinning of bugkilled trees is expected to reduce snag densities and the risk of continued spread into other nearby trees.

A total of 1,285 acres of early and mid seral coniferous forest habitats would be treated in the project area, and are expected to continue to develop along trajectories more favorable than existing trajectories for the 20 years following implementation due to reduced competition for space and resources and reduced risk of drought, disease, fire, and insects. The treated areas consist of about 10% of the early and mid seral conifer forest in the analysis area.

Cumulative Effects to Habitat in the Analysis Area: Past timber harvesting, prescribed burning, wildland fire exclusion and wildfires have affected early and mid seral coniferous forest habitats in the analysis area (see Tables 6 and 7). Portions of the recent wildfires in the analysis area resulted in early seral habitat, although other portions resulted in a shrub dominated habitat. Over 4,000 acres of reforestation created early seral conifer plantations (although these may be listed as another habitat type due to shrub, oak, or residual conifers), and pre-commercial thinning has opened up early seral stands to improve their resiliency and increase the likelihood these stands develop into mid-seral habitat. These habitats increased after past clearcut timber harvests on federal land, continue on private land, and will result from reforestation of burned and harvested older stands. There may also be a flush of new growth in areas with light to moderate burning, where openings occur amongst existing larger trees that provide a seed source.

Ongoing and future projects on the National Forest tend to favor mature forest and include similar treatments to the Sunny South Project that are intended to maintain and enhance early and mid seral stands by thinning to increase their resilience and improve their trajectory toward developing late seral closed canopy characteristics. Recent fires have increased the rate of conversion of late seral stands to shrub, oak, and early seral forest habitat, depending on site-specific conditions. With ongoing fire suppression and climate change, this trend is expected to continue, creating new early seral conifer forest habitat, despite active vegetation management. Because the number of acres that would have burned or

will burn in wildland fires in the analysis area is not known and subject to debate, the magnitude of the effect of wildland fire exclusion on the quantity of these habitats is unknown.

Thinning projects in early and mid seral conifer stands in the analysis area reduce tree canopy closure (by removing small trees to achieve desired residual spacing) and increase size classes slightly. Early and mid seral habitats grow relatively quickly. Early seral habitats may grow to mid seral size during the analysis period (20 years before and after present). Mid seral habitats are less likely to mature into late seral within the time frame of the analysis period.

Cumulative Effects Conclusion: Early and mid seral conifer forest habitat are well represented in the Sunny South analysis area and in the project area due to large wildfires and past clearcuts. These stands are generally dense and are expected to benefit from thinning. The proposed project would treat a large portion of these areas, although extensive areas would remain untreated. The commercial thinning, and prescribed burning would improve the resilience of these stands while other areas would be left untreated, providing areas of refuge without disturbance and with existing dense canopy cover. Thinning is expected to increase diversity and understory vegetation, including early seral, herbaceous, and shrub species. The project would also replant areas subject to extensive bugkill, if needed. Overall, there would likely be a slight gain of early seral habitat, while mid seral habitat would increase growth to begin to resemble late seral conifer forest. Over time, with ongoing growth and increased resiliency, both age classes would change. The conversion of small areas of bugkill, combined with surrounding thinning and the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to early and mid seral coniferous forest habitats.

Summary of Mountain Quail Status and Trend at the Bioregional Scale

The TNF Forest Plan (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the mountain quail; hence, the early and mid seral coniferous forest effects analysis for the Sunny South Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the mountain quail. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend: There are currently 530,851 acres of early seral and 2,776,022 acres of mid seral coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend for early seral is decreasing (changing from 9% to 5% of the acres on National Forest System lands) and the trend for mid seral is increasing (changing from 21% to 25% of the acres on National Forest System lands).

Population Status and Trend: Monitoring of the mountain quail across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes fox sparrow, hairy woodpecker, and yellow warbler (USDA Forest Service 2010a, <http://data.prbo.org/partners/usfs/snmis/>). Mountain quail were detected on 40.3 percent of 1659 point counts (and 48.6% of 424 playback points) in 2009 and 47.4% of 2266 point counts (and 55.3% of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.103 in 2009 and 0.081 in 2010. These data indicate that mountain quail continue to be distributed across the 10 Sierra Nevada National Forests. In addition, mountain quail continue to be monitored and surveyed in the Sierra Nevada at various sample locations by hunter survey, modeling, and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of mountain quail populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Mountain Quail Trend:

Changes in canopy closure and size class of 1,285 acres or less out of 12,805 acres of early and mid seral coniferous forest habitats in the Sunny South project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

Late Seral Open Canopy Coniferous Forest Habitat [Sooty (blue) grouse]**Habitat/Species Relationship.**

The sooty grouse was selected as the MIS for late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures less than 40%. Sooty grouse occurs in open, medium to mature-aged stands of fir, Douglas-fir, and other conifer habitats, interspersed with medium to large openings, and available water, and occupies a mixture of mature habitat types, shrubs, forbs, grasses, and conifer stands (CDFG 2005). Empirical data from the Sierra Nevada indicate that Sooty Grouse hooting sites are located in open, mature, fir-dominated forest, where particularly large trees are present (Bland 2006).

Project-level Effects Analysis - Late Seral Open Canopy Coniferous Forest Habitat**Habitat Factor(s) for the Analysis:**

- (1) Acres of late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P]. Tree size 6 canopy closure S and P are used for this analysis due to the crosswalk used from pre-fire vegetation which reduced the multi-layer forest type into habitat that would be considered Late Seral Open Canopy Coniferous Forest Habitat.
- (2) Acres with changes in tree canopy closure class.
- (3) Acres with changes in understory shrub canopy closure class.

Current Condition of the Habitat Factor(s) in the Project Area:

There are currently an estimated 37 acres of late seral open canopy coniferous forest habitat type within the treatment area and 486 acres within the larger analysis area; thus about 8% of the available late seral open canopy habitat in the analysis area is in the project area. The current available habitat is only about 1% of the analysis area, providing a relatively small proportion of the habitat. Typically, where trees grow well enough to develop late seral habitat conditions, they develop densely, largely due to fire suppression that might otherwise leave stands relatively open except for large, residual trees. Where fires leave late seral open habitat, these areas are typically replanted, quickly developing into early and mid seral habitats. In the absence of reforestation, these stands will often develop into dense shrublands or oak dominated stands; in this sense, this habitat type, while important for some species, may be relatively ephemeral, similar to post-fire snag dominated stands (sometimes referred to as complex early seral).

Proposed Action**Direct and Indirect Effects to Habitat.**

Treatments proposed within 37 acres of suitable late seral open canopy habitat would affect about 8% of this habitat type in the analysis area. These treatments are not expected to substantially alter this habitat type and would not reduce acres of this habitat, because canopy cover would generally remain the same,

and the larger trees would be retained except where they pose a roadside hazard. While thinning in dense stands would not create open canopy habitat, in places with extensive bugkill, some areas may become more open and provide some of these habitat values. In these more open portions of units, relatively few, if any trees would be removed. Understory shrub cover would be temporarily reduced by these treatments, but is expected to largely recover within 10-20 years. The treatments are expected to reduce existing densities and fuels, increasing the resilience of remaining trees and increasing the rate at which remaining trees grow. Hazard tree removal may remove a limited number of trees that are contributing to canopy cover, but are not expected to reduce the average canopy cover within treatment units.

Planting is proposed within areas of bugkill in the analysis area that may contain large residual trees and may come to resemble late seral open canopy forest. Planting is proposed in areas that experienced a high level of tree mortality and would begin to fill in the canopy of these areas within several decades, becoming early seral forest. Residual live trees would contribute to vertical and structural diversity as these stands continue to develop. Associated site preparation for planting occurring within these areas would reduce shrub canopy as needed to reduce competition with planted trees for several years. It is expected that planting with site preparation would reduce shrub canopy cover in all areas that are treated, because the open canopy condition would provide sufficient light for shrubs to become reestablished.

Overall the proposed action would have minimal effects to late seral habitat and is not expected to reduce available habitat or reduce the average canopy cover in treatment units. Shrub canopy class changes are expected on 37 acres that are subject to prescribed burning.

Cumulative Effects to Habitat in the Analysis Area. Ongoing fire suppression allows shade-tolerant trees to grow in densely in the understory of existing forested stands and created dense stands with a high risk of stand-replacing fire. In the absence of fire suppression and timber harvest, large trees stood over fairly open stands with frequent, low-intensity fire. The historic vegetation condition, while variable, is thought to have included more late seral open canopy forest than currently occurs in much of the western Sierra Nevada and may explain why relatively little of this habitat occurs in the project area compared to closed canopy late seral forest, which is more at risk to regular stressors such as disease, drought, insects, and fire, as well as climate change. Because more open stands are in relatively good condition, late seral open canopy stands have received less treatment in recent years; nonetheless, these stands have been affected by continued fire suppression and large wildfires.

Portions of the recent wildfires in the analysis area removed late seral open habitat while other areas created mixed severity and served to thin denser stands. The American Fire, for example, removed about 270 acres of late seral open canopy habitat in 2013, but post-fire treatments did not appreciably change the remaining habitat to another habitat type. Like the proposed Sunny South project, treatments in this habitat type tend to be limited and consist of treatments such as roadside hazard tree removal, pre-commercial thinning of smaller trees, and prescribed burning. While these treatments may reduce understory shrub cover, they tend to increase the resiliency of stands, particularly to wildfire, and maintain the large trees and open stands.

Although the extent of timber harvest on private timberlands that may have affected the acreage or condition of late seral open canopy forest in the analysis area is unknown, the current condition and extent of habitat reflects past treatments. Aggressive timber harvest on private lands may retain scattered large trees as seed sources or as required by state standards, and contribute to this habitat on private lands. These areas may remain longer if not reforested.

The planned Cuckoo and Biggie projects overlap the analysis area for the Sunny South project and include late seral open canopy habitat. These projects are expected to have similar thinning and fuels treatments, while retaining large trees. As described above, these types of treatments typically result in

minimal treatments in late seral open canopy habitat and would likely contribute to the Sunny South project's retention and increased resiliency of existing forested stands.

Cumulative Effects Conclusion: The proposed treatments would retain late seral open canopy coniferous forest habitat. The Sunny South project would reduce shrub canopy cover which would somewhat reduce habitat quality temporarily, but this effect is expected to be temporary and minimal. The greatest effects to this habitat type have resulted from past and ongoing fire suppression, which has led to denser stands and an increased likelihood and severity of wildfires, which have occurred extensively in and around the analysis area, resulting in a conversion of this habitat type to other habitat types. The Sunny South project is expected to contribute to other recent and planned projects that would conserve this habitat type, thin overly dense stands, and reduce the likelihood of its loss to fire or other stressors. The project would not contribute to the larger, more adverse effects to this habitat type.

Summary of Sooty Grouse Status and Trend at the Bioregional Scale

The Tahoe NF LRMP (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the sooty grouse; hence, the late seral open canopy coniferous forest effects analysis for the Big Hope Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the sooty grouse. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend. There are currently 63,795 acres of late seral open canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, red fir, and eastside pine) habitat on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is decreasing (changing from 3% to 1% of the acres on National Forest System lands).

Population Status and Trend. The sooty grouse has been monitored in the Sierra Nevada at various sample locations by hunter survey, modeling, point counts, and breeding bird survey protocols, including California Department of Fish and Game Blue (Sooty) Grouse Surveys (Bland 1993, 1997, 2002, 2006); California Department of Fish and Game hunter survey, modeling, and hunting regulations assessment (CDFG 2004a, CDFG 2004b); Multi-species inventory and monitoring on the Lake Tahoe Basin Management Unit (LTBMU 2007); and 1968 to present – BBS routes throughout the Sierra Nevada (Sauer et al. 2007). These data indicate that sooty grouse continue to be present across the Sierra Nevada, except in the area south of the Kern Gap, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of sooty grouse populations in the Sierra Nevada north of the Kern Gap is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Sooty Grouse Trend.

The proposed action would not reduce Late Seral Open Canopy Coniferous habitat and would therefore not contribute to the reduction in habitat resulting from cumulative actions. A reduction in shrub canopy cover within 37 acres of the 486 acres of suitable habitat within the analysis area may somewhat reduce habitat quality for this species, but the effect is expected to be temporary and offset by the beneficial effect of reducing understory fuels and treatment in the surrounding denser habitats. There would be no net loss of Late Seral Open Canopy Coniferous habitat and therefore would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of sooty grouse across the Sierra Nevada Bioregion.

Late Seral Closed Canopy Coniferous Forest Habitat (California spotted owl, Pacific marten, and northern flying squirrel)

Habitat/Species Relationship

California spotted owl: The California spotted owl was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. The California spotted owl is strongly associated with forests that have a complex multi-layered structure, large-diameter trees, and high canopy closure (CDFG 2005, USFWS 2006). It uses dense, multi-layered canopy cover for roost seclusion; roost selection appears to be related closely to thermoregulatory needs, and the species appears to be intolerant of high temperatures (CDFG 2005). Mature, multi-layered forest stands are required for breeding (Ibid). The mixed-conifer forest type is the predominant type used by spotted owls in the Sierra Nevada: about 80 percent of known sites are found in mixed-conifer forest, with 10 percent in red fir forest (USDA Forest Service 2001).

Pacific Marten: The Pacific marten was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. Martens prefer coniferous forest habitat with large diameter trees and snags, large down logs, moderate-to-high canopy closure, and an interspersed of riparian areas and meadows. Important habitat attributes are: vegetative diversity, with predominately mature forest; snags; dispersal cover; and large woody debris (Allen 1987). Key components for Westside and Eastside marten habitat can be found in the Sierra Nevada Forest Plan Amendment FEIS (USDA Forest Service 2001), Volume 3, Chapter 3, part 4.4, pages 20-21.

Northern flying squirrel: The northern flying squirrel was selected as an MIS for late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat in the Sierra Nevada. This habitat is comprised primarily of medium/large trees (equal to or greater than 24 inches dbh) with canopy closures above 40% within ponderosa pine, Sierran mixed conifer, white fir, and red fir coniferous forests, and multi-layered trees within ponderosa pine and Sierran mixed conifer forests. The northern flying squirrel occurs primarily in mature, dense conifer habitats intermixed with various riparian habitats, using cavities in mature trees, snags, or logs for cover (CDFG 2005).

Project-level Effects Analysis – Late Seral Closed Canopy Coniferous Forest Habitat

Habitat Factor(s) for the Analysis: (1) Acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat [CWHR ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6]; (2) Acres with changes in canopy closure (D to M); and (3) Acres with changes in large down logs per acre or large snags per acre.

Current Condition of the Habitat Factor(s) in the Analysis Area: The spatial extent (totaling an estimated 38,189 acres) of the analysis area extends 1.5 miles beyond the maximum spatial extent of proposed project activities (Fig. 2) to include habitats that California spotted owl, Pacific marten, or northern flying squirrel might use that overlap with the project, but not so large as to dilute the effects on habitats for these species from the Sunny South Project. Approximately 668 acres of late seral closed canopy coniferous forest occur in the project footprint, Approximately 9,035 acres of late seral closed

canopy coniferous forest occurs throughout the surrounding analysis area. The canopy closure, snag density, and number of large down logs per acre are generally high, providing high quality habitat and suitability for species associated with this habitat type.

Proposed Action

Direct and Indirect Effects to Habitat: The late seral closed canopy areas in the project area tend to be along streamcourses and other sites of residual older trees that escaped the Volcano Fire and outside the fire boundary, were spared from aggressive past logging practices. Where these stands are located in riparian buffers they would receive little or no treatment; in other areas the effect of understory thinning among larger trees would do little to reduce habitat quality, while providing a more open understory that would be more likely to survive fire.

The project would remove smaller trees and open the canopy somewhat, to a target 40-50% cover, but is not expected to reduce the availability of large trees, dense canopy, logs, or snags in the project areas. Dense accumulations of snags would be removed and adjacent stands of green trees would be thinned more aggressively, where needed, but these are expected to consist of small patches in otherwise dense stands of conifers.

Treatments are expected to reduce competition among trees for space and resources, resulting in better survival and increased rates of growth; as a result, the canopy cover should recover over the medium to long term and stands will be more resilient to insects, drought, fire and disease. As described in the Biological Evaluation for this project, almost 80% of the existing canopy cover is expected to return within 20 years as remaining trees continue to grow and fill in openings. The improved resiliency is expected to benefit the entire 668 acres of this habitat that would be treated in the project area and contribute to habitat values in the 9,035 acres of this habitat in the analysis area. Treatments to reduce fuels and density in other habitats in the project area would reduce the resulting risk of stand-replacing fire and thus benefit late seral closed canopy habitat. Some of the late seral closed canopy habitat in the analysis area is associated with spotted owl and goshawk PACs; treatments in adjacent project units are expected to reduce the likelihood of the continued spread of bugkill or stand-replacing fire into these particularly important areas without directly affecting them.

Snag and large woody debris would be retained throughout the project area. The quantity of snags present in the project area is expected to be reduced from the current high levels in the bugkill areas, while largely retained in deficit areas, such as the Volcano fire plantations. Snags are described in more detail in the following section; regardless, the area contains a relatively low density of snags outside the bugkill areas but as more trees die, sufficient snags are expected to remain after treatment. Large woody debris is similarly distributed within the project area, scarce in plantations and more abundant in natural stands, and will largely be retained. Retained snags will contribute to recruiting large woody debris as they eventually fall. Because treated stands are expected to continue growing and be more resilient to stressors, in the decades after treatment, they would provide a more sustainable recruitment of large snags and large woody debris. The risk of the current bugkill is a large flush of snags, loss of canopy cover and green forest, increased fuels, and little future recruitment. The project is expected to retain sufficient snags and provide opportunities to develop larger trees and future large snags and woody debris.

Cumulative Effects to Habitat in the Analysis Area: Past timber harvesting, prescribed burning, and wildland fire suppression activities have affected late seral closed canopy coniferous forest habitats in the analysis area, including clearcuts and other aggressive timber harvesting on private land and Forest Service lands prior to implementation of the CASPO guidelines in 1993. The quantity of large down logs and snags will generally be reduced although most uneven-aged vegetation management during the past 20 years has been conducted utilizing prescriptions under either the CASPO Interim Guidelines (adopted

in 1993) or revised Forest Plan standards adopted in 2001 and further revised in 2004 to limit treatments in PACs and to maintain canopy cover at a minimum of 40% [at least 50% in spotted owl Home Range Core Areas (HRCAs)], logs, and snags.

Recent commercial thinning prescriptions are generally “thinning from below,” aimed at removing understory trees in the suppressed and intermediate canopy classes and some co-dominant trees while retaining overstory trees and the largest trees in the treated stands. These treatments reduced habitat quality by reducing canopy closure and snag recruitment, but also maintained existing habitats, and reduced the risk of adverse effects from high severity wildland fire to late seral closed canopy habitat. Of the past projects in the analysis area listed in Table 7, treatments such as commercial thinning, private timber harvest, group selection, and seed tree cutting reduced spotted owl habitat quality by reducing canopy cover. Overstory removal and seed tree cut treatments likely also reduced habitat suitability as these treatment types reduced canopy cover below the level considered suitable.

A total of 6 spotted owl Protected Activity Centers (PACs) are entirely or partially within the 1.5-mile analysis area of the Sunny South Project. The PACs do not all meet the criteria for late seral closed canopy forest, but they would all be managed similarly, retaining the existing canopy cover and snags. As described in the BE, the PACs tend to have more large trees, a higher quadratic mean diameter (QMD, a weighted average tree size) and higher canopy cover than the surrounding area. Surrounding the PACs are larger Home Range Core Areas (HRCAs) that are managed to maintain 50% or greater canopy cover. The HRCAs are broader, foraging and dispersal habitat, so provide a kind of buffer or feathering with management in general forest. The PACs and HRCAs generally provide the best late seral closed canopy habitat for associated species, including marten, flying squirrel, and others.

Wildfires occurring over the last 20 years have burned about 2,800 acres of the 38,189-acre analysis area. These fires affected much larger areas outside the analysis area. Because the stands planted after the 1960 Volcano Fire have been thinned and contain open understories, these areas are at relatively low risk from fires. Burned areas, particularly severely burned areas, may reduce habitat quality or convert it to a different habitat type entirely, particularly oak and shrub-dominated stands. The fires and resulting salvage timber harvest of dead trees likely reduced availability of habitat, although planned reforestation and fuels reduction may contribute to restoring this habitat in the very long term. Removing a minimal number of hazard trees is not expected to reduce overall canopy cover or tree size class but would slightly reduce habitat quality because snags and large trees are important habitat attributes. Wildland fire suppression is expected to continue, resulting in increasing vegetation density and risk of stand-replacing fire. Planned fuel reduction activities would help to offset the continued build-up of fuels and stand density.

Over the past 20 years private land timber harvests have occurred on about 2,700 acres. It is expected that private timber harvests have maintained a minimal quantity of suitable spotted owl habitat. The effects of past actions can best be quantified by discussing what is present today. While suitably dense mature stands occur on private land, the areas subjected to timber harvest generally do not contain sufficient large trees, density, or complexity to provide late seral closed canopy habitat.

A little over 3,000 acres planned Cuckoo and Biggie Fuel Reduction and Vegetation Management Projects are also within the analysis area of the Sunny South project. The Cuckoo project is a vegetation management project under development while the Biggie project is near implementation; both projects consist of similar stand thinning and burning components, but also include various other fuels treatments, precommercial thinning of younger conifer plantations, and other treatments. These projects are expected to have similar effects as the proposed action by increasing the resilience of stands by thinning, while retaining important characteristics of mature stands and protecting spotted owl and

northern goshawk PACs. These projects would contribute to short-term adverse effects and long-term beneficial effects.

Overall past, present, and reasonably foreseeable future projects on National Forest land have reduced late seral closed canopy habitat quality in the short term while maintaining habitat suitability, except the approximately 1,300 acres with overstory removal and seed tree cuts, which greatly reduced habitat suitability. The Sunny South project would have similar effects as more recent projects on the National Forest and would maintain important habitat values such as canopy cover, snags, and logs. Like these other projects, under current Forest Plan standards, the reduction in canopy cover is expected to recover in several decades.

Cumulative Effects Conclusion: Overall past, present, and reasonably foreseeable future projects on forest land have maintained late seral closed canopy habitat except in a small percentage of areas treated with overstory removal or seed tree cuts, which reduced habitat suitability. Other projects in the analysis area are extensive, but resulted in generally short-term adverse effects while contributing to improved long term conditions. The proposed Sunny South project would have similar effects as recent projects on National Forest land and would maintain late seral closed canopy conifer forest with some reduction in habitat quality in the short term. The beneficial effects, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to late seral closed canopy coniferous forest habitats.

Summary of Status and Trend at the Bioregional Scale

California spotted owl, Pacific marten, and Northern flying squirrel: The Tahoe NF Forest Plan (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the California spotted owl, Pacific marten, and northern flying squirrel; hence, the late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitat effects analysis for the Sunny South Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data. This information is drawn from the detailed information on habitat and population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Habitat Status and Trend: There are currently 1,006,923 acres of late seral closed canopy coniferous forest (ponderosa pine, Sierran mixed conifer, white fir, and red fir) habitats on National Forest System lands in the Sierra Nevada. Over the last two decades, the trend is slightly increasing (changing from 7% to 9% of the acres on National Forest System lands); since the early 2000s, the trend has been stable at 9%.

Population Status and Trend – California spotted owl: California spotted owl has been monitored in California and throughout the Sierra Nevada through general surveys, monitoring of nests and territorial birds, and demography studies (Verner et al. 1992; Gutierrez et al. 2008, 2009, 2010; USDA Forest Service 2001, 2004, 2006b; USFWS 2006; Sierra Nevada Research Center 2007, 2008, 2009, 2010). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although there may be localized declines in population trend [e.g., localized decreases in “lambda” (estimated annual rate of population change)], the distribution of California spotted owl populations in the Sierra Nevada was stable.

A recent analysis of the nearby Eldorado study area population concluded that California spotted owl occupancy declined 31% and the population declined 50% between 1990 and 2012 (Tempel 2014). An analysis of the effects of forest management on California spotted owls using data from the same study

concluded that reductions in canopy cover in dense stands (>70% canopy cover) from either logging or wildfire may be contributing to the study population decline (Tempel et al. 2014). Tempel et al. (2014) noted that fuels treatments can have a negative effect on habitat quality in the short term but the benefit of reducing long-term wildfire risk must be considered and additional research is needed to determine the trade-offs. That study noted that the actual effect of medium-intensity timber harvests on reproduction was only weakly supported (ibid.).

The Eldorado study area includes 37% private lands, including industrial timber lands and a growing residential component. Vegetation management projects on private lands do not include the same protections for wildlife that exist on public lands. Although demographic studies can detect population declines, and loss of habitat is considered a likely cause, these studies were not designed to identify causes. The SNAMP team did consider various vegetation treatments and the risk of fire.

Population Status and Trend – Pacific marten: Pacific marten have been monitored throughout the Sierra Nevada as part of general surveys and studies since 1996 (e.g., Zielinski et al. 2005, Moriarty 2009). Since 2002, the Pacific marten has been monitored on the Sierra Nevada forests as part of the Sierra Nevada Forest Plan Amendment (SNFPA) monitoring plan (USDA Forest Service 2005, 2006b, 2007b, 2009, 2010b). Current data at the rangewide, California, and Sierra Nevada scales indicate that, although marten appear to be distributed throughout their historic range, their distribution has become fragmented in the southern Cascades and northern Sierra Nevada, particularly in Plumas County. The distribution appears to be continuous across high-elevation forests from Placer County south through the southern end of the Sierra Nevada, although detection rates have decreased in at least some localized areas (e.g., Sagehen Basin area of Nevada County).

Population Status and Trend – northern flying squirrel: The northern flying squirrel has been monitored in the Sierra Nevada at various sample locations by live-trapping, ear-tagging, camera surveys, snap-trapping, and radio-telemetry: 2002-present on the Plumas and Lassen National Forests (Sierra Nevada Research Center 2007, 2008, 2009, 2010), and 1958-2004 throughout the Sierra Nevada in various monitoring efforts and studies (see USDA Forest Service 2008, Table NOFLS-IV-1). These data indicate that northern flying squirrels continue to be present at these sample sites, and current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of northern flying squirrel populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Trends

California spotted owl: Because smaller trees would be removed and larger trees retained, the average tree diameter would remain the same or slightly increase in some stands, which is expected to improve the resiliency of about 668 acres of this habitat type. Because implementation of the proposed action would retain existing late seral closed canopy coniferous forest, and generally retain large down logs and large snags, the Sunny South Project would not alter the existing trend in the habitat, nor will it lead to a change in the distribution of California spotted owl across the Sierra Nevada bioregion.

Pacific marten: Because smaller trees would be removed and larger trees retained, the average tree diameter would remain the same or slightly increase in some stands, which is expected to improve the resiliency of about 668 acres of this habitat type and allow the continued growth and development of mature forest habitat. Because implementation of the proposed action would retain existing late seral closed canopy coniferous forest, and generally retain large down logs and large snags, the Sunny South Project would not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Pacific marten across the Sierra Nevada bioregion.

Northern flying squirrel: Because smaller trees would be removed and larger trees retained, the average tree diameter would remain the same or slightly increase in some stands, which is expected to improve the resiliency of about 668 acres of this habitat type. Because implementation of the proposed action would retain existing late seral closed canopy coniferous forest, and generally retain large down logs and large snags, the Sunny South Project would not alter the existing trend in the habitat, nor will it lead to a change in the distribution of northern flying squirrel across the Sierra Nevada bioregion.

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

Habitat/Species Relationship

The hairy woodpecker was selected as the MIS for the ecosystem component of snags in green forests. Medium (diameter breast height between 15 to 30 inches) and large (diameter breast height greater than 30 inches) snags are most important. The hairy woodpecker uses stands of large, mature trees and snags of sparse to intermediate density; cover is also provided by tree cavities (CDFG 2005). Mature timber and dead snags or trees of moderate to large size are apparently more important than tree species (Siegel and DeSante 1999).

Project-level Effects Analysis – Snags in Green Forest Ecosystem Component

Habitat Factor(s) for the Analysis: (1) Medium (15-30 inches dbh) snags per acre; and (2) large (greater than 30 inches dbh) snags per acre.

Current Condition of the Habitat Factor(s) in the Analysis Area: The spatial extent (totaling an estimated 38,189 acres) of the analysis area extends 1.5 miles beyond the maximum spatial extent of proposed project activities (Fig. 2) to include habitats that hairy woodpecker might use that overlap with the project, but not so large as to hide effects on habitats for this species from the Sunny South Project.

This analysis used green conifer and oak forest types with an average tree size greater than 11 inches dbh (CWHR size classes 4,5, and 6) in GIS. Stands predominately defined by shrubs or smaller trees such as those found in plantations were not included. Approximately 2,445 acres of potentially suitable green forest occurs in the project area and 31,401 acres of this habitat type exists within the surrounding analysis area. Snag data was not collected, but based on field visits and past treatments, snags are sparse in the plantations, where the relatively young age (50 years) and past thinning has limited the development of snags. There are low to moderate stand densities in mixed conifer stands in the project area and surrounding analysis area, where larger trees and less managed landscapes have allowed snags to develop and remain. There are high densities of snags in the pockets of bugkill evident in the stands and from roads and lakeshores; however, the extent of these areas is poorly described. These areas are expected to expand somewhat, due to large numbers of insects that tend to move to adjacent green trees and can overwhelm the trees' ability to defend themselves. The natural stands are relatively dense with larger trees, and so drought, insects, and disease have substantially elevated the density of available snags.

Proposed Action

Direct and Indirect Effects to Habitat: The project units were chosen in part based on the growing patches of bugkill and the concern that the die-off is likely to continue, because of the elevated number of beetles. The bugkill appears to disproportionately affect medium and large snags (over 15 inches dbh). Although the majority of snags in the pockets would be removed, either as timber or to be piled and burned, individual snags and some of the bugkill would be left to provide this important habitat component throughout the project areas. Densities in the project area would be reduced immediately after implementation, but it is likely more would be recruited in steep areas or riparian buffers, as well as in

adjacent untreated areas. Because the project is intended to thin the stands and prevent continued bugkill, it is expected to affect medium and large snag density, particularly snag recruitment, over time. Thinning reduces competition between trees and increases tree survivorship, leading to the growth of larger trees and reduces short-term medium and large snag recruitment. The benefit to thinning is that continued survival and growth of the remaining trees would provide a continuous source for snag recruitment over the long term (20-100 years). The reduced risk of stand loss would also provide better stand resilience to fire and the similar, rapid, but unsustainable recruitment of snags.

Cumulative Effects to Habitat in the Analysis Area: Past timber harvesting, prescribed burning, and wildland fire exclusion activities have affected the availability of snags in green forest habitat in the analysis area, including clearcuts on private land and Forest Service lands prior to implementation of the CASPO guidelines and later Forest Plan amendments. Past salvage sales in response to bugkill removed all snags in an attempt to mistakenly “sanitize” stands of snags and associated insect. These treatments left much of the Sierran forests understocked with snags and overstocked with green trees and other understory vegetation. Clearcuts eliminate this habitat type until long term forest recovery occurs, whereas ongoing thinning and the current bugkill treatment attempts to stop the spread while retaining snags for their important ecosystem services. Hazard tree removal along roads, campgrounds, powerlines, and other facilities tends to leave these linear areas continuously deficit in snags.

The portions of the spotted owl and goshawk PACs within the 1.5-mile analysis area of the Biggie project (approximately 1,900 acres) typically retain a dense canopy cover and existing snag densities with minimal timber management under the Forest Plan, so unless management direction changes, these areas would retain snags, tend to recruit more snags due to disease, drought, or insect outbreaks, and would likely provide high quality snag habitat in green forest. While portions of the associated spotted owl Home Range Core Areas (HRCAs, an additional 4,363 acres) are within project units or may be treated in other projects, are managed to retain a higher canopy cover of 50% than general forest, and so are more likely to retain and recruit more snags. Riparian areas are generally excluded from treatment as well, and so would also retain existing snags and large trees. Portions of the analysis area are in steep, roadless river canyons; the pockets of bugkill occurring in these areas and many others in the analysis area will remain and will likely continue to spread, particularly in the steep, thin-soiled, and south-facing areas.

Wildfires occurring over the last 20 years have burned portions of the 38,189-acre analysis area and substantially larger areas in the surrounding landscape. The Codfish, American, Ralston, and Peavine fires all occurred within a portion of the analysis area. Burned areas, particularly severely burned areas, may reduce habitat quality or convert it to a different habitat type entirely. Where fires burn at moderate to low intensity, they may create snags within a remaining largely green forest, whereas higher severity result in the more open burned forest snag habitat. About 300 acres of the American fire burned with moderate to low severity in the analysis area, creating many areas with scattered snags in green forest. Remaining green trees may have been damaged such that they will be at increased risk of mortality in the future. These types of damages and higher risk of mortality serve to recruit new snags over time.

Climate change is another important factor in forest composition, yet the hardest to predict. The Sierra climate subjects trees to regular stresses in the form of long, hot, dry summers. In addition, California receives periodic droughts, the last of which provided insufficient rain for many trees to fight off insect attack, leading to the current condition. In the face of climate change, it is expected that droughts, higher temperatures, and extreme fire behavior will become more common and challenge the resiliency of Sierran ecosystems, particularly conifer forests. Although this and other similar projects are intended to increase the resilience of conifer stands by reducing ladder fuels and competition for water, space, light, and nutrients, it is likely vast untreated areas will still be at high risk and it is still unknown as to whether our best efforts will be sufficient for the ongoing changes. The ecosystem may change such that

sustainable recruitment of medium and large snags is impossible, as shrubland and oaks are more capable of quickly recovering from fire.

Private land accounts for 9,932 acres or 26% of the analysis area. Over the past 20 years private land timber harvest have occurred over 2,700 acres. Private timber harvest is typically aggressive and does not attempt to retain snags or green overstory with a snag component. It is likely all the private timber land, as well as areas of plantations on National Forest lands, were generally deficient in snags prior to the bugkill. The effect of these lands on the availability of snags averaged over the entire area; however, is limited because the majority of land is on the Tahoe National Forest, some portions of private land are not heavily harvested, and density is likely higher in other areas, including the PACs, drainages, and roadless areas.

Recent projects in the analysis areas include the Deadwood, Shirttail Succor Oak, Oliver, and other projects, that consisted largely of thinning and fuel reduction of about 4,000 acres within Volcano Fire plantations and older mixed conifer stands in the Sugar Pine area. The planned Cuckoo and Biggie Fuel Reduction and Vegetation Management Projects also overlap about 3,000 acres of the analysis area of the Sunny South project. These projects are vegetation management projects under development that consist of similar stand thinning and fuel reduction activities, as well as precommercial thinning of younger plantations, hazard tree removal, and thinning around rust-resistant sugar pines. Biggie and Cuckoo would also retain snags, although the projects may change in response to continued bugkill. These projects would have a similar effect of increasing stand resilience and the likelihood of growing larger trees that would provide snags over the long-term while reducing the likelihood of a sudden flush of snags in a fire or bugkill.

Overall wildfire has had a large effect on the availability of all habitat types, including snags in green forest, but the area contains a high density of snags and is at risk of producing more than the green forest can continue to recruit, despite past and planned fuels reduction, thinning, clearcutting, and reforestation. Because many stands are at risk of decline, the proposed action would not appreciably reduce snag density, but would serve to moderate the recruitment of new snags over time and increase the likelihood of survival of a green tree overstory. The analysis area would thus contain a varied landscape of conditions and snag densities.

Cumulative Effects Conclusion: High severity fires and clearcut harvest have reduced snag density within a green forest matrix, whereas ongoing retention in PACs, streamside buffers, and other areas provide higher densities of medium and large snags. Past actions have reduced existing medium and large snag densities and increased the potential for recruitment of larger snags in the future within the analysis area. Medium and large snag density would be reduced under the proposed action immediately following implementation. The proposed action is expected to result in an increase in large snags several decades in the future following temporary reductions during the analysis period as retained trees would grow to larger size classes sooner and be recruited as large snags when they finally die. The slightly beneficial effects of treatment, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to the snags in green forest ecosystem component.

Summary of Hairy Woodpecker Status and Trend at the Bioregional Scale

The TNF Forest Plan (as amended by the SNF MIS Amendment) requires bioregional-scale habitat and distribution population monitoring for the hairy woodpecker; hence, the snag effects analysis for the Biggie Project must be informed by both habitat and distribution population monitoring data. The sections below summarize the habitat and distribution population status and trend data for the hairy woodpecker. This information is drawn from the detailed information on habitat and distribution

population trends in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a), which is hereby incorporated by reference.

Ecosystem Component Status and Trend: The current average number of medium-sized and large-sized snags (≥ 15 " dbh, all decay classes) per acre across major coniferous and hardwood forest types (Westside mixed conifer, ponderosa pine, white fir, productive hardwoods, red fir, eastside pine) in the Sierra Nevada ranges from 1.5 per acre in eastside pine to 9.1 per acre in white fir. In 2008, snags in these types ranged from 1.4 per acre in eastside pine to 8.3 per acre in white fir (USDA Forest Service 2008).

Data from the early-to-mid 2000s were compared with the current data to calculate the trend in total snags per acre by Regional forest type for the 10 Sierra Nevada national forests and indicate that, during this period, snags per acre increased within Westside mixed conifer (+0.76), white fir (+2.66), productive hardwoods (+0.35), and red fir (+1.25) and decreased within ponderosa pine (-0.16) and eastside pine (-0.14). Detailed information by forest type, snag size, and snag decay class can be found in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010a). Snags have been increasing substantially in the Sierra Nevada as a result of several years of drought, subsequent bug-kill to stressed trees, and ongoing climate change. Although effects are most dramatic in the southern Sierra, they are occurring throughout the Sierra, resulting in an estimate in spring 2016 of 60 million trees killed. Pockets of bug-killed trees occur in the project area, the larger analysis area, and throughout the landscape. The substantial increase in snags is expected to benefit associated insect species, insectivorous birds and other animals, and cavity nesting birds.

Population Status and Trend: Monitoring of the hairy woodpecker across the ten National Forests in the Sierra Nevada has been conducted since 2009 in partnership with PRBO Conservation Science, as part of a monitoring effort that also includes mountain quail and fox sparrow (USDA Forest Service 2010a, <http://data.prbo.org/partners/usfs/snmis/>). Hairy woodpeckers were detected on 15.1% of 1,659 point counts (and 25.2% of 424 playback points) in 2009 and 16.7% of 2,266 point counts (and 25.6% of 492 playback points) in 2010, with detections on all 10 national forests in both years. The average abundance (number of individuals recorded on passive point count surveys) was 0.116 in 2009 and 0.107 in 2010. These data indicate that hairy woodpeckers continue to be distributed across the 10 Sierra Nevada National Forests. In addition, the hairy woodpeckers continue to be monitored and surveyed in the Sierra Nevada at various sample locations by avian point count and breeding bird survey protocols. These are summarized in the 2008 Bioregional Monitoring Report (USDA Forest Service 2008). Current data at the rangewide, California, and Sierra Nevada scales indicate that the distribution of hairy woodpecker populations in the Sierra Nevada is stable.

Relationship of Project-Level Habitat Impacts to Bioregional-Scale Hairy Woodpecker Trend: Changes in the density of medium and large snags on 2,700 acres of green forests in the Sunny South Project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

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